Black Wax Processing Project

Notice of Intent for an Approval Order
Public Copy

Prepared for
Tesoro Refining and Marketing Company
Salt Lake City Refinery

September 2011

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1.0 Introduction

This Notice of Intent (NOI) package is submitted for approval of the Black Wax Processing Project (Project) at the Tesoro Refining and Marketing Company's (Tesoro's) Salt Lake City (SLC) Refinery. The SLC Refinery currently operates under Approval Order (AO) DAQE-AN0103350051-11. The SLC Refinery is situated on 236 acres in Salt Lake County, approximately 1.5 miles north of downtown Salt Lake City.

The Project involves changes to the following process units of the refinery:

1. Black Wax Crude Receiving and Processing
2. Fluidized Catalytic Cracking Unit (FCCU)
3. Distillate Desulfurization Unit (DDU)

The Project will add Black Wax crude unloading facilities, including a replacement Tank 188 for storage of Black Wax crude. To improve processing of Black Wax crude, the Crude Unit will be modified with upgrades to the desalter, heat exchange system, and pumps. At the FCCU, the changes will improve product yields and increase production of light products due to additional residence time in the FCCU riser, additional wet gas compressor capacity, tower internals, pumps and exchangers at the Vapor Recovery Unit (VRU). The changes at the DDU will include feed pump and exchanger upgrades along with a new DDU reactor. The Project will result in associated actual emissions increases at several refinery process units as a result of the increase in utilization. The Project will not result in a significant emission increase or significant net emission increase in air emissions from the refinery and is therefore not subject to federal New Source Review (NSR) requirements.

The Project's estimated start of construction date is in May 2012. The new and modified equipment are expected to begin operations in 2013.

Rule R307-401-3(b) requires submittal of an NOI to "make modifications or relocate an existing installation which will or might reasonably be expected to increase the amount or change the effect of, or the character of, air contaminants discharged, so that such installation may be expected to become a source or indirect source of air pollution." The Project will result in an increase in the amount of air contaminants discharged from multiple emission units. Rule R307-401-5 requires that the NOI contain specific information related to the process, nature of emissions, control device(s), and regulatory applicability and compliance.

This NOI is organized as follows:

- Section 2.0 contains a project description,
- Section 3.0 contains an NSR applicability analysis,
- Section 4.0 contains a description of regulatory applicability and compliance demonstration,
- Section 5.0 contains a summary of the NOI requirements,
- Attachment A contains a site diagram,
- Attachment B contains the project emission calculations,
- Attachment C contains EPA guidance on NSR project aggregation, and
- Attachment D contains a reference letter from EPA Region 4.

2.0 Project Description

This section includes a general description of the facility and details of the proposed Project.

2.1 General Facility Information

The Tesoro Salt Lake City Refinery is located at 474 West 900 North, Salt Lake City, Utah. The refinery is located in a nonattainment area for $PM_{2.5}$, PM_{10}, and SO_2. The area is also a designated maintenance area for ozone (VOC and NO_x) and CO. Attachment A includes a figure which shows the location of the refinery in Salt Lake City.

2.2 Modified Process Units

The Project involves changes to the following components of the refinery:

1. Black Wax Crude Receiving and Processing
2. Fluidized Catalytic Cracking Unit (FCCU)
3. Distillate Desulfurization Unit (DDU)

Each of these major components are discussed in additional detail below.

2.2.1 Black Wax Crude Handling and Processing Changes

The Black Wax facilities will be modified as part of the Project to increase Black Wax deliveries and processing of the Black Wax crude. The overall objective is to install truck unloading facilities and provide enough storage through tank optimization and replacement of one tank to handle additional Black Wax crude. Pump and exchanger upgrades at the Crude Unit will allow the unit to handle the heavier crude. The existing desalters may be modified or a new desalter may be installed. Wastewater will be treated to reduce the benzene content.

2.2.1.1 Crude Unit Process Description

The fractionation towers at the Crude Unit are used to separate crude oil into separate streams by heating crude oil and then drawing the streams from the tower at their varying boiling points. For energy recovery, the product streams are used to heat crude entering the unit using a series of exchangers. At the appropriate location in the pre-heat train, the crude is washed to remove salts in a Desalter. Following the pre-heat train the Crude Heater Furnace (H-101) is used to further heat the crude prior to the crude fractionators. The fractionators are used to separate the streams by their boiling point. Several pumparounds in the fractionators are used to transfer heat from the fractionators into the crude feed. The streams exiting the fractionators are then routed to other units for further processing.

2.2.1.2 Unloading Rack

The unloading rack will be used to unload trucks containing Black Wax crude. Proposed physical changes at the unloading rack include the following:

- A new loading bay to accommodate additional Black Wax crude. The existing rack will be utilized for overflow trucks. The truck rack will utilize a sump that can be pumped out. The sump will be heated and appropriately sized to accommodate a spill.
- Transfer piping from the new unloading rack to a new common header between Tank 188 and Tank 206 will be installed.

2.2.1.3 Black Wax Crude Storage Tanks

Tesoro currently uses Tank 188 as one of its primary storage/working tanks for Black Wax crude. Tesoro proposes to replace the existing Tank 188 due to the age of the current tank. The specifications of the replacement Tank 188 are as follows:

- A charge pump will be installed at/near the new tank to the Crude Unit.
- A transfer pump will be installed at Tank 206 to transfer Black Wax to the replacement Tank 188.
- A replacement Tank 188 will be constructed as a 135' x 48' (with foundation), nominal 100 MBBL tank with a standard fixed roof and internal floating roof (IFR). It will be equipped with internal floor-mounted steam coils capable of maintaining a full tank heated to 180 °F.

Tesoro currently uses Tank 291 as its other primary storage/working tank for Black Wax crude. Tesoro will continue to use Tank 291 for storage of Black Wax crude at a rate similar to current operations.

Tank 206 is currently used as a backup tank for FCCU feed or decant oil (DCO). As part of this Project, Tesoro intends to use Tank 206 for periodic storage of Black Wax crude. An internal floating roof will be installed to control emissions from Tank 206.

2.2.1.4 Crude Unit Changes

The crude unit is being modified to process increased rates of Black Wax crude. The modifications will include:

- Upgrades to the main crude charge pumps and booster pumps for the heavier feed stock

- Changes in the heat exchange configuration to improve heat recovery
- Upgrades or replacement of the Desalter to remove crude contaminants
- Upgrades to the crude fractionation column

2.2.1.5 Benzene NESHAP Compliance

With the modifications to the crude unit, it is anticipated that additional controls will be required to treat the wastewater to control benzene. Several options are being evaluated for benzene control and the appropriate technology will be selected to meet benzene limits in the wastewater. One option being considered is a steam stripper to remove benzene from the wastewater. Another option is an air stripper followed by thermal oxidation. Tesoro has conservatively considered both options in the project emission calculations.

2.2.2 Fluidized Catalytic Cracking Unit (FCCU) Changes

The proposed changes to the FCCU will increase gasoline and diesel production from the refinery by increasing the FCCU's bottoms conversion and capacity. The bottoms conversion will be increased by extending and expanding the FCCU riser. FCCU conversion will be maintained at higher rates with changes to the existing wet gas compressor at the Vapor Recovery Unit (VRU) and by retaining the current discharge pressure.

2.2.2.1 Process Description

The FCCU uses heat, pressure and catalysts to convert heavy oils into lighter products such as gasoline and diesel. The FCC process uses a catalyst in the form of very fine particles that act as a fluid when aerated. Fresh feed is preheated and introduced into the riser with hot regenerated catalyst, vaporizing the feed. The hydrocarbon vapors are separated from the catalyst particles by cyclones in the reactor (reactor cyclones). The reaction products are sent to a fractionator for separation. The spent catalyst from the FCCU is regenerated by a controlled combustion process in the regenerator to remove (burn off) the coke deposited on the catalyst, and recycled back to the riser/ reactor complex. The offgases from the catalyst regenerator are routed to the CO Boiler and an Electrostatic Precipitator (ESP). The overhead (lighter) products from the fractionator are partially condensed and the liquid and vapor are sent to the VRU for further processing.

The VRU takes the lighter products from the FCC and separates them into various products. After being condensed in the main fractionators, the overhead gases are compressed and routed to an absorber for recovery of LPG from fuel gas. The liquids condensed in the main fractionators overhead are routed to several columns to separate heavy FCC gasoline (HCN), light FCC Gasoline (LCN), a mixture of propylene and propane, and a mixture of normal, iso and butenes. The HCN is routed to a gasoline hydrotreater for sulfur removal and then to gasoline blending. Light FCC gasoline is routed to gasoline blending. The mixed propylene / propane and mixed normal, iso and butenes are routed to the alkylation unit. The alkylation unit reacts propylene and butenes with iso butane to produce high quality alkylate for gasoline blending.

2.2.2.2 FCCU Riser Changes

The proposed new FCCU riser will increase the riser residence time to allow sufficient time to crack the heavy oil from the atmospheric resid into lighter products. As a result, the recycle rate of Heavy Cycle Oil (HCO) will be reduced and the selectivity of the cracking will be improved resulting in less fuel gas and coke produced due to overcracking by the unit. The riser portion of the project will not increase the design feed rate to the FCCU or the maximum coke burn rate at the FCCU regenerator.

Proposed physical changes include the following:

- Install a new riser with increased residence time for improved heavy oil cracking.
- Install a new rough cut cyclone.
- Install new secondary cyclones, a new plenum and a new, larger overhead line.
- Modify the Main Fractionator internals.
- Relocate the sponge oil return line.

There will be no modifications to the FCCU regenerator, CO boiler, or ESP as part of this Project.

2.2.2.3 VRU Upgrade

The proposed physical changes to the VRU will increase the unit capacity of the FCCU without loss of conversion. The existing wet gas compressor will be upgraded for higher capacity by making upgrades to the compressor rotor and turbine. The VRU upgrades are projected to increase the FCCU feed rate to [redacted] as a result of relieving the limitation of wet gas compressor capacity and downstream separation facilities.

Proposed physical changes include the following:

- Install a demisting system on the wet gas compressor KO drum (F-101.
- Upgrade the existing wet gas compressor and turbine.
- Increase the surface area in the existing wet gas compressor discharge coolers.
- Upgrade trays in the absorber, lean oil, pre-fractionator, depropanizer, debutanizer, and alky deethanizer towers.
- The glycol cooling system will be upgraded to increase cooling streams to the absorber.

- Upgrade the lean oil and absorber gas stream chillers for increased duty.
- Upgrade the pre-fractionators, depropanizer and debutanizer overhead condenser bundles with increased area and reduced pressure drop.
- Install an additional pre-fractionator overhead pump.
- Install an additional debutanizer overhead pump.
- Upgrade the feed pump to the alky deethanizer column.

2.2.2.4 CO Boiler Bypass Installation

A bypass around the CO boiler will be installed routing gases from the FCCU regenerator to a new quench system and then to the ESP. The quench system will be used to control the temperature of the gas stream to maintain ESP performance. This bypass would be used in the event of issues at the CO Boiler requiring maintenance and/or shutdown.

The existing CO Boiler bypass stack (PS #9) will be eliminated as part of this Project. The changes allow Tesoro to use its ESP to control particulate emissions during bypass events. It is important to note that Tesoro views this CO Boiler bypass work as being a separate project from the Black Wax Processing Project, given that it addresses the operational issue of being able to use the ESP during bypass events, and it not economically or technically dependent upon the larger Black Wax Processing Project. However, it has been included with this application given that the work is expected to occur during the same timeframe.

2.2.3 Distillate Desulfurization Unit (DDU) Changes

This Project will increase the DDU capacity to a rate of [redacted] while improving energy efficiency and maintaining safe operation. Additional details are presented below.

2.2.3.1 Process Description

The charge to the DDU from the Crude Unit and FCCU is combined in the feed surge drum. The charge oil is then combined with recycle and make-up hydrogen. The feed enters a two bed reactor which operates with a hydrogen quench in its middle. The reactor effluent enters the reactor feed/ effluent exchangers. Reactor effluent is then separated into oil, gas, and sour water streams. The oil stream enters the fractionator for separation into diesel product, gas, and naphtha. The fractionator bottoms stream (diesel product) is pumped through heat exchangers and to storage. The fractionator overhead vapor is cooled in the overhead condensers compressed in the K687 compressor, treated in the low pressure amine contactor, and routed to fuel gas. The overhead naphtha is currently pumped to the top of the crude tower but may be rerouted to the Gasoline Hydrotreater (GHT) stabilizer, which would not impact refinery emissions.

2.2.3.2 Equipment Changes

The Project will include the following changes:

- Install a new feed pump replacing one of the existing pumps
- Install new reactor feed/effluent exchangers .
- Install a new reactor to meet distillate specifications
- Modify tower internals and change the location of the feed tray.
- Install a new reboiler/diesel product pump
- Reconfigure the feed and reboiler heaters from a single pass to a dual pass furnace design.
- Repipe the fractionator feed bottoms exchangers from the current configuration of 4 shells in series to 2 parallel banks of 2 exchangers in series.

The overhead naphtha plus reflux flow capacity may be increased, or the overhead naphtha stream may be rerouted to the GHT stabilizer to minimize the reprocessing cost.

2.3 Affected Non-Modified Process Units

The changes at the FCCU, VRU, DDU, and Black Wax crude receiving and storage areas will impact some of the refinery's current operations and existing equipment. These impacts were simulated using process modeling software and the linear programming model, which incorporates both the FCCU model and gas plant simulation. The impacts determined through the use of the process model are described in the subsections below.

Fuel gas production and consumption will be higher but no modifications are anticipated to the fuel gas system. Additional fuel gas will be produced as a result of the increased rate and conversion at the FCCU. The Project is also likely to increase the heating value of the fuel gas and require less natural gas to be purchased as make-up to the V-917 fuel gas drum. Another impact to the fuel gas system compared to current operations is the pending startup of the Benzene Saturation Unit (BSU), which will be a consumer of hydrogen from the Ultraformer Unit (UFU). Tesoro has not yet begun operations of the BSU and is therefore not considered an affected process unit. Tesoro expects the H_2S content in the fuel gas system to decrease compared to baseline conditions, but for purposes of this NOI, has conservatively assumed that the H_2S concentration will be unchanged compared to the current operations.

To support the increased production rates and associated desulfurization, additional hydrogen may be purchased through Tesoro's existing contract with Linde Gas North America, LLC (Linde). Linde is located at 2351 North 1100 West, Salt Lake City, operating under Approval Order DAQE-

GN0130910004-08. Linde is a separate stationary source under NSR since it does not meet all three criteria to be considered a single stationary source with Tesoro (contiguous or adjacent, same SIC code, common control). In addition, Tesoro will continue to consume less than 50% of the hydrogen produced by Linde following the Project so the plant is not considered a "support facility" under federal NSR rules.[1]

2.3.1 Ultraformer Unit (UFU)

The Project will result in increased utilization of the UFU. There will also be an increase in gas firing rate at the UFU Furnace (F-1), UFU Regeneration Heater (F-15), and the Ultraformer compressors (K1s).

2.3.2 Gasoline Hydrotreater (GHT)

Higher conversion to lighter products will result in increased utilization of the GHT. This will require additional steam for operation of the GHT stripper reboiler. There will also be an increase in gas firing rate at the GHT process heater (F-701).

2.3.3 Sulfur Recovery Unit (SRU)

The increase in throughput of lighter products from the FCCU and upgrades to the DDU will result in an increase in sulfur in the feed to the SRU.

As a separate contemporaneous project, Tesoro proposes to install a tail gas treatment unit (TGTU) at its Sulfur Recovery Unit (SRU) as part of this Project to reduce SO_2 emissions. TGTUs are designed to convert additional sulfur compounds back into H_2S for recovery as elemental sulfur. This project is described further in Section 3.5.1.

2.3.4 Cogeneration Unit Turbines

There will be several new pumps installed as part of the Project. As a result, the Project will require additional electricity. Tesoro has conservatively assumed that this additional electrical load will be generated from its Cogeneration Unit Turbines rather than reducing its export of electricity to the grid.

[1] August 25, 1999 letter from Robert Miller of EPA Region 5 to William Baumann of Wisconsin DNR.

2.3.5 Cogeneration Unit Heat Recovery Steam Generating Units (HRSGs)

The Project will result in additional steam requirements at multiple process units to be produced by the Cogeneration Heat Recovery Steam Generators (HRSGs). A refinery-wide steam balance was used to determine the projection of refinery steam requirements following the Project.

2.3.6 Cooling Tower UU3

The Project will include modifications to heat exchangers that will increase exchanger sizes. Cooling water rates will remain relatively constant; however, heat duty load to the cooling tower will increase. Additionally, Tesoro will clean out the cooling tower lines to improved circulation and perform maintenance on the drift eliminator to ensure proper operation. As a result of increases in exchanger size and therefore surface area where process fluid leaks could occur, Tesoro has conservatively assumed that emissions will increase from the cooling tower.

2.3.7 Storage Tanks

The Project will require a new Black Wax crude storage tank to replace the existing Tank 188. Tank 206 will be used for short-term storage of Black Wax crude during maintenance events, but an internal floating roof will be installed at the tank to reduce emissions.

There will also be minor increases in tank emissions associated with the increased throughput of products. The incremental increase in throughput of multiple intermediates and products predicted for the Project is applied to the worst-case tank, selected based on the tank which results in the highest working losses. The highest working losses occur at tanks that have the least controls and/or the smallest diameter. The worst-case tanks for which emission increases are calculated are as follows:

- Tank 212: Distillate fuel oil No. 2,
- Tank 242: Heavy catalytic naphtha,
- Tank 243: Salt Lake regular gasoline,
- Tank 307: LSR gasoline,
- Tank 321: Light catalytic naphtha,
- Tank 324: Gasoline,
- Tank 328: Reformer splitter bottoms,
- Tank 330: Salt Lake premium gasoline,

- Tank 331: Alkylate, and
- Tank 503: Ethanol.

2.3.8 Loading Rack Impacts

The completion of the Project will result in an increase in loadout of the following products:

- Decanted oil,
- Propane,
- Butane,
- Gasoline (with ethanol blending),
- Diesel, and
- Jet kerosene.

2.4 Project Schedule

The estimated start of construction is May 1, 2012, pending permit approval. The system is expected to begin operations in 2013.

2.5 Relationship to Other Projects

Tesoro has considered the relation of this Project with two recently permitted projects (CONOx and FCCU Overhead Condensing), and the 2007 FCCU Reliability Project. Tesoro has considered whether the projects need to be aggregated for purposes of federal New Source Review (NSR) applicability as a single "physical change."

EPA's policy states that nominally separate changes, which are sufficiently related based on established criteria, be aggregated into a single common project for the purpose of determining PSD applicability (i.e., determining the project related emissions increases). To do so, potentially related individual actions at a source are evaluated to determine whether the activities in the aggregate should be evaluated as a single project (i.e., one physical or operational change). The EPA policy documents on aggregation outline an approach that relies upon case-specific factors (e.g., timing, funding, and the company's records) and the relationship between nominally separate activities. Activities are aggregated together for purposes of determining PSD applicability if there is a technical or economic relationship between the activities. A collection of EPA's past policies relevant to whether a project should be aggregated is included in the April 15, 2010 Federal Register notice entitled "Prevention of Significant Deterioration (PSD) and Nonattainment New Source

Review (NSR): Aggregation; Reconsideration."[2] A summary of those and other relevant aggregation-related information related to that notice is included in Appendix C.

The terms ''technically dependent'' and ''technical dependence'' describe the interrelationship between projects such that one project is incapable of performing as planned in the absence of the other project. This means that, absent another project, the process change cannot operate without significant impairment, or for the planned amount of hours, or at the planned rating or production level, or that it operates in a manner that results in a product of inferior quality. Activities are dependent on each other for their economic viability if the economic revenues or ''Return on Investment'' (ROI) associated with the project could not be realized without the completion of another project. EPA proposed an approach that would require that a source treat one project as economically dependent on another if it is no longer economically viable without the completion of the other project(s).[3] Economic viability is measured by assessing the ROI or payback of a project, such that a project is not economically viable if it does not pay for itself (e.g., yield a positive ROI) in the absence of another related project.

Based on this guidance for purposes of the analysis performed in support of this application, to determine if a technical or economic relationship existed the following questions were asked for each project that was identified and reviewed:

1. Would the Black Wax Processing Project's operating hours, production rate, or product quality be impaired if the additional project (under review) was not or had not been performed?

2. Would the additional project's (under review) operating hours, production rate, or product quality be impaired if the Black Wax Processing Project was not performed?

3. Would the ROI associated with the Black Wax Processing Project be reduced if the additional project (under review) was not or had not been performed?

4. Would the additional project's (under review) ROI be reduced if the Black Wax Processing Project was not performed?

As the first step in the analysis, a listing of the potential projects requiring evaluation was developed. Projects were identified based on their proximity in timing with the proposed action and their possible relationship with emissions units that will be physically modified as part of the proposed

[2] 75 Fed. Reg. 19570, 19,571.

[3] 71 Fed Reg 54246.

project and their objective relative to the Project's objective. The results of this effort identified the following projects for review:

- CONOx Project,
- FCCU Overhead Condensing Project, and
- 2007 FCU Reliability Project.

CONOx Project: The CONOx Project has been recently approved by the Utah Department of Environmental Quality and also involves physical modifications at the FCCU. A review of this project's technical objective (i.e., to allow operation of the catalyst regenerator using a deeper partial burn) indicates that to be conservative this work should be aggregated with the Black Wax Processing Project. As a result, Tesoro will not commence construction on the CONOx Project until the same time as other changes are made to the FCCU under this proposed action, and has considered the emissions impact of the CONOx Project as part of the projected emissions associated with the Black Wax Processing Project.

FCCU Overhead Condensing Project: The FCCU Overhead Condensing Project has been recently approved by the Utah Department of Environmental Quality and also involves physical modifications at the FCCU. A review of this project's technical objective (i.e., to improve the operability of the FCCU overhead system) indicates that to be conservative this work should be aggregated with the Black Wax Processing Project. As a result, Tesoro will not commence construction on the FCCU Overhead Condensing Project until the same time as the changes to the FCCU associated with the Project, and has considered the emissions impact of the FCCU Overhead Condensing Project as part of the projected emissions following the Project.

2007 FCU Reliability Project: As noted in the NOI for 2007 FCU Reliability Project (2007 Project), the project was designed to "increase the reliability of the FCU" and "reduce the regenerator temperature and pressure, increasing feed flexibility by allowing the use of heavier feed stocks." As further explained, "[t]he intent of the project is to improve the reliability of the FCU, not to increase feed capacity nor the production of gasoline and/or diesel.[4]" Rather, before and after the project, "FCU throughput capacity . . . remain[ed] at 23,000 barrels per day and production of gasoline and diesel [did] not increase significantly.[5]"

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4 May 2006 Fluid Catalytic Cracking Unit (FCU) Reliability Project, Notice of Intent, Section 2.3, page 4.

5 IBID Section 2.4, page 5.

In contrast, the Black Wax Processing Project's objective is to increase the facility's capacity to produce clean fuels based on significant changes in market conditions that occurred after 2007. Traditionally, refineries in the Salt Lake City have been constrained by the limited market in Utah and the limited ability to ship product to other regions of the country. However, on April 19, 2006, Holly Corporation announced that they were exploring the possibility of constructing a 12-inch refined products pipeline project from Salt Lake City, Utah to Las Vegas, Nevada (the "UNEV Pipeline"). On July 9, 2007, Holly Corporation announced plans to construct the UNEV Pipeline. When construction is completed, this pipeline will significantly increase demand for refined products produced in the Salt Lake City area and will allow area refineries to efficiently operate at higher capacities. The proposed project will increase the refinery's gasoline production capacity, taking advantage of this pipeline and the new market openings created by the pipeline for the Salt Lake City refineries.

In addition, beginning in 2010, Black Wax crude became an advantaged crude due to its cost relative to other crudes available to the Salt Lake City Refinery. As a result, the project economics are largely based on the ability to process additional Black Wax crude.

Based on the differing objectives of these two projects, it is concluded that the two projects are not substantially related from a technical or economic perspective and, therefore, constitute independent actions. More specifically, the following is the case:

1. **The Black Wax Processing Project's operating hours, production rate, or product quality would not be impaired if the FCU Reliability Project had not been performed.** The objective of the work planned as part of the Black Wax Processing Project, and more specifically at the FCCU, is to increase gasoline and diesel production by increasing the FCCU's bottoms conversion and capacity (i.e., to improve the control of and the extent of the cracking reactions that occur in the FCCU reactor). Extending and expanding the FCCU riser will increase the bottoms conversion achieved at the FCCU. The modifications to the riser will in-turn allow the FCCU's conversion to be maintained at the higher rates allowed by the changes to the existing wet gas compressor at the VRU. These enhancements, and the subsequent ability to produce more diesel and gasoline product from the newly identified opportunity crude, (i.e., Black Wax crude) define the technical objective of the Black Wax Processing Project. In contrast, the FCU Reliability Project was directed at improving the reliable operation of the FCCU regenerator. This was accomplished through multiple changes to the regenerator portion of the FCCU directed at improving spent catalyst distribution, combustion air distribution, mixing between the catalyst and combustion air. Additional changes were made to the regenerator cyclones and stripper to reduce the catalyst particulate emissions and the level of afterburn in the regenerator. There is no technical relationship between the changes planned to improve the FCCU's diesel and gasoline production as part of the Black Was Processing Project and the changes made as part of the FCU Reliability Project to improve the reliable operation of the FCCU regenerator.

2. **The FCU Reliability Project's operating hours, production rate, or product quality are not improved by the Black Wax Processing Project.** As conclude above, there is no technical relationship between the changes planned to improve the FCCU's diesel and gasoline production as part of the Black Was Processing Project and the changes made as part of the FCU Reliability Project to improve the reliable operation of the FCCU regenerator.

3. **The ROI associated the Black Wax Processing Project is not changed by the fact that the FCU Reliability Project was performed.** The ROI associated with the Black Wax Processing Project is based on the additional barrels of diesel and gasoline that will be produced at the increased processing rates allowed by the changes to the FCCU riser, fractionator and downstream VRU. At the time the FCU Reliability Project was developed and approved, Black Wax crude was not considered to be an opportunity crude and the UNEV had not yet been announced. As a result, the ROI associated with and used to justify the FCU Reliability Project was based upon a more stable regenerator operation and the benefits the improved stability would create. Thus, there is no economic relationship between Black Wax Processing Project and the FCU Reliability Project.

4. **The ROI associated with the FCU Reliability Project's ROI is not improved by the Black Wax Processing Project.** As concluded above, there is no economic relationship between the Black Wax Processing Project and the FCU Reliability Project.

As a final consideration, it should be noted that the two projects are separated by six (6) years as the Black Wax Processing Project will not be initiated until spring 2012. As a result, it is concluded that these two projects constitute separate and independent actions by the Tesoro Salt Lake City Refinery.

3.0 NSR Applicability Analysis

Utah rules implement the New Source Review (NSR) permitting program for major sources and major modifications. Rule R307-403 and R307-405 implement the federal Nonattainment New Source Review (NNSR) and Prevention of Significant Deterioration (PSD) preconstruction permitting programs, respectively. Tesoro is currently a major source as defined in Utah Rule R307-100 and in these federal permitting programs. Therefore, Tesoro has completed an applicability analysis to determine if this Project is a major modification as defined under Utah rules and the NSR permitting program.

The NSR pollutants are covered either by the PSD or NNSR permitting programs, but for purposes of determining applicability as a major modification, the significance thresholds are the same. For simplicity, Tesoro uses the PSD definitions to describe the applicability analysis. The Utah rules, approved by EPA on July 15, 2011, reference the PSD rules in effect on July 1, 2008. For purposes of determining the applicability of the proposed Project, the PSD rules at 40 CFR 52.21 are incorporated by reference into the Utah rules with one exception relevant to this analysis. The exception relevant to permitting of this Project is regulation of greenhouse gases in the same manner as described under the current version of 40 CFR 52.21. The applicability analysis therefore relies upon and references 40 CFR 52.21.

3.1 "Hybrid Test" of PSD Applicability

An NSR applicability analysis has been conducted for the Project to determine if it is a "major modification" under NSR regulations. Because this project involves the proposed modification to both "existing emission units" and "new emissions units," the "hybrid test" is used to determine if a "significant emissions increase" and a "significant net emissions increase" of a "regulated NSR pollutant" will occur. The hybrid test is described as the following:[6]

> *"… A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the emissions increases for each emissions unit, using the method specified in paragraphs (a)(2)(iv)(c) through (e) of this section as applicable with respect to each emissions unit, for each type of emissions unit equals or exceeds the significant amount for that pollutant (as defined in paragraph (b)(23) of this section)…"*

[6] 40 CFR 52.21(a)(2)(iv)(f).

The hybrid test refers to the use of two emissions increase calculation methods listed in paragraphs 40 CFR 52.21(a)(2)(iv)(c) and (d). The methods prescribed for existing emissions units are described further below. The remainder of this section focuses on the emissions increase test.

An increase is significant if it exceeds the annual ton per year (tpy) thresholds known as the PSD significant emission rates, which are listed in Table 3-1 for only those regulated NSR pollutants that are emitted in quantifiable amounts from emission units affected by this project.

Table 3-1. NSR Significant Emission Rates

Pollutant[A]	Significant Emission Rate (tpy)
Particulate matter (PM)	25
Particulate matter less than 10 microns (PM_{10})	15
Particulate matter less than 2.5 microns ($PM_{2.5}$)[B]	10
Sulfur dioxide (SO_2)	40
Nitrogen oxides (NO_X)	40
Carbon monoxide (CO)	100
Ozone (O_3)	40 [C]
Sulfuric Acid Mist (H_2SO_4)	7
Greenhouse gases (mass basis)	0
Greenhouse gases as carbon dioxide equivalents (CO_2e)	75,000 [D]

[A] Only those NSR pollutants that are emitted in quantifiable amounts from emission units affected by this project are shown in the table. Condensable particulate matter is included within the definition of PM, PM_{10}, and $PM_{2.5}$ as of January 1, 2011.

[B] The significant emission rate for direct $PM_{2.5}$ emissions is 10 tpy, additionally this includes 40 tpy of SO_2 emissions and/or 40 tpy of NO_X emissions unless they are demonstrated not to be a $PM_{2.5}$ precursor.

[C] The NSR significant emission rate is assessed based on emissions of volatile organic compounds (VOC).

[D] Greenhouse gases are defined as the aggregate group of six greenhouse gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The procedures in 40 CFR 52.21(b)(49) are followed to calculate the CO_2 equivalent emissions. Greenhouse gases are considered a regulated pollutant for a given project if the project emissions increase of CO_2e exceeds 75,000 tpy.

The definition of “regulated NSR pollutant” includes any pollutant that is “subject to regulation”:[7]

> *(50) Regulated NSR pollutant, for purposes of this section, means the following:*
> …
> *(iv) Any pollutant that otherwise is subject to regulation under the Act as defined in paragraph (b)(49) of this section.*

The definition of “subject to regulation” includes detailed provisions on the inclusion of greenhouse gases (GHG):[8]

> *(49) Subject to regulation means, for any air pollutant, that the pollutant is subject to either a provision in the Clean Air Act, or a nationally-applicable regulation codified by the Administrator in subchapter C of this chapter, that requires actual control of the quantity of emissions of that pollutant, and that such a control requirement has taken effect and is operative to control, limit or restrict the quantity of emissions of that pollutant released from the regulated activity. Except that:*
>
> *(i) Greenhouse gases (GHGs), the air pollutant defined in §86.1818–12(a) of this chapter as the aggregate group of six greenhouse gases: Carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, shall not be subject to regulation except as provided in paragraphs (b)(49)(iv) through (v) of this section. …*
>
> *(iv) Beginning January 2, 2011, the pollutant GHGs is subject to regulation if:*
>
> *(a) The stationary source is a new major stationary source for a regulated NSR pollutant that is not GHGs, and also will emit or will have the potential to emit 75,000 tpy CO2e or more; or*
>
> *(b) The stationary source is an existing major stationary source for a regulated NSR pollutant that is not GHGs, and also will have an emissions increase of a regulated NSR pollutant, and an emissions increase of 75,000 tpy CO2e or more; and,*
>
> *(v) Beginning July 1, 2011, in addition to the provisions in paragraph (b)(49)(iv) of this section, the pollutant GHGs shall also be subject to regulation*
>
> *(a) At a new stationary source that will emit or have the potential to emit 100,000 tpy CO2e; or*
>
> *(b) At an existing stationary source that emits or has the potential to emit 100,000 tpy CO2e, when such stationary source undertakes a physical change or change in the method of operation that will result in an emissions increase of 75,000 tpy CO2e or more.*

Pursuant to §52.21(b)(49), GHG is not subject to regulation and thus is not a regulated NSR pollutant if the CO_2e increase is less than 75,000 tpy. The emissions increase of CO_2e from the proposed project has been calculated in this NOI pursuant to paragraph §52.21(a)(2)(iv) as follows:[9]

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[7] 40 CFR 52.21(b)(50)

[8] 40 CFR 52.21(b)(49)

(iii) The term emissions increase as used in paragraphs (b)(49)(iv) through (v) of this section shall mean that both a significant emissions increase (as calculated using the procedures in paragraph (a)(2)(iv) of this section) and a significant net emissions increase (as defined in paragraphs (b)(3) and (b)(23) of this section) occur. For the pollutant GHGs, an emissions increase shall be based on tpy CO2e, and shall be calculated assuming the pollutant GHGs is a regulated NSR pollutant, and "significant" is defined as 75,000 tpy CO2e instead of applying the value in paragraph (b)(23)(ii) of this section.

"Net emissions increase" means the amount by which the sum of the following exceeds zero:[10]

"(a) The increase in emissions from a particular physical change or change in the method of operation at a stationary source as calculated pursuant to paragraph (a)(2)(iv) of this section; and

(b) Any other increases and decreases in actual emissions at the major stationary source that are contemporaneous with the particular change and are otherwise creditable. Baseline actual emissions for calculating increases and decreases under this paragraph (b)(3)(i)(b) shall be determined as provided in paragraph (b)(48) of this section, except that paragraphs (b)(48)(i)(c) and (b)(48)(ii)(d) of this section shall not apply."

The project emissions increase is calculated as the sum of emissions increases from the existing emissions units that are impacted by this project. If the project emissions increase for a regulated NSR pollutant is less than the significant emission rate, NSR is not required for that pollutant. If the emissions increase is greater than the corresponding NSR significant emission rate, a source has four options:

1. Accept limits on the new or existing emissions units impacted by the project in order to maintain a project emissions increase less than the NSR significant emission rate,

2. Conduct a netting analysis of contemporaneous creditable increases and decreases to determine if the net emissions increase is less than the NSR significant emission rate,

3. Use options 1 and 2 together to maintain the net emissions increase to a level less than the NSR significant emission rate, or

4. Undergo NSR review for the project.

The procedures for performing a netting analysis, as mentioned in Option 2 above, are described in Section 3.1.3. Tesoro is following Option 3 for this Project because it is proposing an SO_2 emission limit at the SRU and has conducted a netting analysis for SO_2 emissions.

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[9] 40 CFR 52.21(b)(49)(iii)

[10] 40 CFR 52.21(b)(3)(i).

3.1.1 Actual-to-Projected-Actual Test for Existing Emissions Units

In 40 CFR 52.21(a)(2)(iv)(c), the actual-to-projected-actual applicability test is described as the following:

> *"(c) Actual-to-projected-actual applicability test for projects that only involve existing emissions units. A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the difference between the projected actual emissions (as defined in paragraph (b)(41) of this section) and the baseline actual emissions (as defined in paragraphs (b)(48)(i) and (ii) of this section), for each existing emissions unit, equals or exceeds the significant amount for that pollutant (as defined in paragraph (b)(23) of this section)."*

Terms within this paragraph that have specific definitions include "existing emissions unit," "projected actual emissions," and "baseline actual emissions." An "existing emissions unit" is any part of a stationary source that emits any regulated NSR pollutant and has been in existence for at least two years from the date it first operated.[11] A description of "projected actual emissions" and "baseline actual emissions" are as follows.

3.1.1.1 Projected Actual Emissions

"Projected actual emissions" are calculated as:[12]

> *"… the maximum annual rate, in tons per year, at which an existing emissions unit is projected to emit a regulated NSR pollutant in any one of the 5 years (12-month period) following the date the unit resumes regular operation after the project, or in any one of the 10 years following that date, if the project involves increasing the emissions unit's design capacity or its potential to emit that regulated NSR pollutant and full utilization of the unit would result in a significant emissions increase or a significant net emissions increase at the major stationary source."*

A source shall consider when determining projected actual emissions any relevant business or regulatory information. In addition, fugitive emissions and emissions associated with startups, shutdowns and malfunctions must be calculated, as applicable. By definition, projected actual emissions shall exclude the portion of the emissions that an existing unit could have accommodated during the baseline period and that are also unrelated to the particular project, including any increased utilization due to product demand growth.[13] A source may use the emission unit's potential to emit in lieu of the aforementioned projected actual emissions calculation.

[11] 40 CFR 52.21(b)(7)(ii).
[12] 40 CFR 52.21(b)(41)(i).
[13] 40 CFR 52.21(b)(41)(ii)(c).

The projected actual throughput for units is based on engineering and business projections. Projected emissions are calculated based on annual throughput following startup of the Project and emission factors representative of expected operation. The emission factors used for the projected emissions are generally also representative of the baseline period. The product demand growth exclusions, or emissions that the units were capable of accommodating during the baseline period, are calculated based on the maximum actual throughput, firing rate, or emission rate experienced during any 1-month period during the 24-month baseline period. This maximum monthly rate is then annualized using a 98% utilization factor for each emission unit. Tesoro has reviewed this annualized rate to confirm that it could have been accommodated during the baseline period. The emission factors used to calculate the product demand growth exclusion are generally consistent with those used for projected emissions, with exceptions noted in Attachment B. The difference between the annualized emissions based on the maximum 1-month throughput and the baseline actual emissions is excluded (i.e. subtracted from) the projected emissions. The emissions increase is then calculated by subtracting the baseline actual emissions from the projected actual emissions. This approach is consistent with that outlined by EPA Region 4 regarding an applicability analysis completed by Georgia-Pacific Wood Products, LLC, included as Attachment D.[14]

As part of the FCCU Reliability Project, Tesoro voluntarily accepted emission limits of NO_x, SO_X, and filterable PM_{10} at the FCCU. With this application, Tesoro is requesting relaxation of the SO_X limit as described below. Tesoro is not requesting any changes to the NO_x or filterable PM_{10} emission limits that were established as part of the previous action.

The emissions limit of 705 tons per year (tpy) SO_X at the FCCU on a 12-month rolling sum was based on the sum of the historical baseline actual annual emissions plus 39 tpy and was taken to maintain minor modification status for the 2007 FCCU Reliability Project. SO_X emissions are calculated as the measured SO_2 emissions multiplied by a factor of 1.05.[15] The SER for SO_2 that would otherwise trigger PSD is 40 tpy. A synthetic minor emissions limit is referred to as an "R4" limit, corresponding to the requirements of 40 CFR 52.21(r)(4) which states:

> *"At such time that a particular source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit*

[14] March 18, 2010 letter from Mr. Worley of EPA Region 4 to Mr. Robinson of Georgia-Pacific Wood Products, LLC.
[15] AO Condition II.B.3.d.1.

a pollutant, such as a restriction on hours of operation, then the requirements or paragraphs (j) through (s) of this section shall apply to the source or modification as though construction had not yet commenced on the source or modification."

In short, if relaxation of an enforceable limit that, in and of itself, causes the particular modification (i.e., the 2007 FCCU Reliability) to become a major modification, then the facility is subject to PSD review as if construction had not yet commenced on the modification.

The Black Wax Processing Project involves physical changes at the FCCU and will increase the FCCU's utilization and corresponding SO_2 emissions. The physical changes were not envisioned as part of the 2007 FCCU Reliability project. Based on the analysis described in Section 2.5, the 2007 and 2012 projects are considered separate modifications for purposes of PSD applicability.

The PSD program as promulgated in 1980 relies on an annualized tons per year applicability approach to determine if a project is a major modification.[16] Such an approach takes into account the level of utilization for which the equipment is operated in a year, meaning that a project can choose to avoid PSD by accepting operational limits on capacity or hours of use. If these limits are made enforceable, they are reflected in the source's PTE.

The EPA was concerned that this new applicability test would allow a source to circumvent the preconstruction requirements of the rule by accepting an operational limit that was unrealistic (i.e., the source intended to use it for longer than was prescribed in order to satisfy profit goals). The source could obtain a minor permit relatively quickly and begin construction earlier than if it had to wait for a major PSD permit, then after startup the source could apply for a major NSR permit to relax the original limit.

EPA addressed this issue through the "source obligation" provision at 40 CFR 52.21(r)(4). In the 1980 final rule (45 FR 52689), EPA described the R4 provision as follows:

"Finally, as a result of today's policy, a potential problem exists concerning the future relaxation of a preconstruction permit that previously caused a proposed stationary source to enjoy minor rather than major status. For example, a source might evade NSR through agreement to unrealistically stringent operating limitations in its permit, and later obtain a relaxation of this condition. The Agency believes that the problem can be dealt with by 40 CFR

[16] The original PSD rule in 1974 had a different applicability test using hourly emissions at maximum capacity before versus after the project. This test is the same as that in the New Source Performance Standards (NSPS) program in 40 CFR 60.

§52.21(r)(4), entitled "Source Obligation." That paragraph provides that any owner or operator of a source, who would receive a relaxation of a permit condition that had enabled avoidance of NSR, would then become subject to review for all units subject to the original permit, as if they were new sources. In other words, if operational limitations are to be considered as an aspect of a source's design, it is reasonable that the permit accurately incorporate that design. If such operation is changed, the permit and concomitant obligations should be correspondingly changed."

Finally, in 1989 EPA described three options available in the event that a PSD avoidance condition will be exceeded (54 FR 27280):

"1. Enforce the limitations in the permit, but allow the source to retain its minor status when the source intends to adhere to the emissions limitations in the future;

2. Invoke the source obligations in R4 and require the source to obtain a major NSR permit, but without penalty, when there is a legitimate reason for the source to request the relaxation (e.g., as a change in business plans); or

3. Determine that the source obtained a permit containing limitations allowing it to escape major NSR without intending to actually operate as a minor source, with the appropriate penalty for such deliberate circumvention."

EPA differentiates between circumvention (Option 3) and legitimate business plan changes (Option 2) as a function of addressing operational limits. However, no statement is made in a regulatory preamble as to the disposition of R4 limits when a future physical change is made to the emissions unit. The common belief as to why EPA did not address this is because the policy focuses on sources that would take a limit, then ask for a relaxation of that limit without any other associated physical or operational change. The key term in the R4 provision is "solely" – the only action requested by the source is to relax the limit that avoided PSD. Therefore, if a legitimate future modification is requested as part of the proposed relaxation, that relaxation is not the sole action being requested.

Based on this regulatory history, it is concluded that the R4 provision was not intended to apply to future legitimate modifications. As another basis for this conclusion, if R4 were to apply to all future modifications, then an emissions unit would be allowed only one minor modification in its entire life. Given the hair-trigger definition of modification where any non-routine change can potentially be a modification to the unit, a source could never expand an emission unit's capacity to accommodate ever-changing market conditions. The PSD program does not cap emissions on a given unit after a single modification; rather, it evaluates applicability on actual annual emissions resulting from an individual project/modification. As long as a project is not divided into multiple modifications (called "sham" permitting), then each project should be evaluated individually for PSD applicability.

If the PSD applicability determination requires that an R4 limit be removed or changed to be consistent with the new potential to emit (or projected actual emissions) of the emissions unit, then a permit modification is needed; however, the original project for which the initial limit was taken should not be subject to PSD review.

It should be noted that the 705 tpy SO_X limit on the FCCU, which was proposed as part of the 2007 FCCU Reliability Project permitting, is an artifact of the 1980 PSD rule and EPA's policy which generally requires the use of an actual to potential emissions increase test as the basis for to determining PSD applicability. Since then, the 2002 PSD Reform Rule has been incorporated into Utah's approved SIP. Under the Reform Rule, a baseline to projected actual emissions test, which is used to determine the directly attributable project related emissions increases, is allowed. If the baseline to projected actual emissions had been allowed and used as part of the 2007 FCCU Reliability Project's permitting, no annual emissions limit would have been required.

In an April 14, 2011 meeting, Tesoro reviewed in further detail with UDAQ the above permitting guidance showing that removal of the previous 705 tpy SO_X limit on the FCCU is appropriate, because of the extensive physical changes to the FCCU that are separate from the 2007 Project.

3.1.1.2 Baseline Actual Emissions

"Baseline actual emissions" for an existing emissions unit are calculated as:

> *"… the average rate, in tons per year, at which the emissions unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 10-year period immediately preceding either the date the owner or operator begins actual construction of the project, or the date a complete permit application is received by the Administrator for a permit required under this section or by the reviewing authority for a permit required by a plan, whichever is earlier, except that the 10-year period shall not include any period earlier than November 15, 1990."*

For baseline actual emissions, Tesoro has defined a 24-month baseline period specific to each NSR pollutant. Tesoro has considered emissions between January 1, 2008 and June 30, 2011, for all pollutants for its baseline emissions analysis. The 24-month baseline periods are chosen because they are considered the most representative of past and current capabilities of units being affected by this project for those pollutants (i.e., this time period is indicative of capabilities that exist today and could be utilized with variations in crude slate or intermediates). Refer to Attachment B for documentation of the baseline periods selected and the calculated baseline actual emissions.

As with projected actual emissions, baseline actual emissions shall include fugitive emissions and emissions associated with startups, shutdowns, and malfunctions.[17] The baseline emissions are adjusted downwards to remove non-compliant emissions that may have occurred during the 24-month baseline or emissions that would have exceeded a current emission limitation.[18] Tesoro has adjusted downward measured fuel gas H_2S concentrations that exceeded the applicable emission limit under NSPS Subpart J, during certain startup, shutdown, malfunction events during the baseline period.

Generally, baseline actual emissions are calculated according to the following hierarchy:

1. Continuous emission monitoring system (CEMS) data
2. Stack test results and measured process data
3. Standard emission factors from public sources and measured process data (i.e. EPA's AP-42)

The only exception to this hierarchy is for calculation of SO_2 emissions from the Cogeneration Unit. Tesoro operates an SO_2 CEMS at the stack to determine compliance with NSPS Subpart J for the fired HRSG duct burners and maintains this CEMS in accordance with Appendix B to 40 CFR 60. The concentration readings are typically less than 5 ppmv, and there is no exhaust gas flow meter. Tesoro calculated actual emissions using the CEMS data and a site-specific F-factor and compared those results to calculated emissions using the measured fuel gas H_2S concentrations. The calculated actual emissions using the CEMS data were higher than the calculated actual emissions using the measured H_2S concentrations, which would result in an inappropriately high baseline actual emission rate. Therefore, Tesoro has calculated the baseline actual emissions from the Cogeneration Unit based on the measured fuel gas H_2S concentrations since this approach is conservative for purposes of determining PSD applicability.

3.1.2 Actual-to-Potential Test for New Emissions Units

In 40 CFR 52.21(a)(2)(iv)(d), the actual-to-potential applicability test is described as the following:

> *"(d) Actual-to-potential test for projects that only involve construction of a new emissions unit(s). A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the difference between the potential to emit (as defined in paragraph (b)(4) of this section) from each new emissions unit following completion of the project and the baseline actual emissions (as defined in paragraph (b)(48)(iii) of this section) of these units before the project*

[17] 40 CFR 52.21(b)(48)(ii)(a).
[18] 40 CFR 52.21(b)(48)(ii)(b)-(c).

equals or exceeds the significant amount for that pollutant (as defined in paragraph (b)(23) of this section)."

Terms within this paragraph that have specific definitions include "new emissions unit," "potential to emit," and "baseline actual emissions." A "new emissions unit" is any part of a stationary source that emits any regulated NSR pollutant and is or will be newly constructed and has existed for less than two years from the date such emissions unit first operated.[19] A description of "potential to emit" and "baseline actual emissions" are as follows.

"Potential to emit" is defined as: [20]

> *"... the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable..."*

The potential to emit for an emissions unit yet to be constructed is generally calculated as the product of its hourly maximum throughput or heat input capacity and an uncontrolled emission factor, which may be from EPA documents (e.g., AP-42), a manufacturer performance guarantee, existing regulatory standards (e.g., a New Source Performance Standard), or from other information sources. Federally enforceable emission limitations on the capacity of the source to emit a pollutant (e.g., air pollution control equipment, restriction on hours of operation) may be taken to reduce the unit's potential to emit.

The methodology in this section may also be applied to estimate maximum emissions from existing emission units to reduce post-project annual emission recordkeeping requirements.

3.1.3 The Netting Equation

For an existing major source for all pollutants, if the project emissions increase of a regulated pollutant exceeds the NSR significant emission rate in Table 3-1, a netting analysis can be performed to indentify creditable contemporaneous emission increases and decreases that have occurred at the refinery. The netting analysis is performed in three steps outlined as follows:

1. **Define Contemporaneous Period.** The contemporaneous period begins with the date five years prior to the estimated (or actual) date of start of construction and ends with the date the

[19] 40 CFR 52.21(b)(7)(ii).
[20] 40 CFR 52.21(b)(4).

emissions increase from the particular change occurs. The term "contemporaneous" is described in more detail below.

2. **Identify Emission Increases/Decreases.** All creditable contemporaneous actual emission increases and decreases that were a result of physical changes or changes in the method of operation at the plant site are summed together.

3. **Calculate Net Emissions Increase.** The emission increases associated with the new modification (i.e, the Project) are added to the contemporaneous increases and decreases to determine the "net emissions increase". If the net emissions increase for any pollutant exceeds the corresponding NSR significant emission rate, that pollutant is subject to the NSR preconstruction permitting requirements.

The contemporaneous emission changes that constitute the second part of the netting equation are also specifically defined and have several qualifiers. Under Federal PSD regulations, an emissions change is contemporaneous to a given project if it occurred within the five years preceding the start of construction of the project or if it will occur between the time construction commences and operation begins. This definition is straightforward. However, the second main qualifier is that the contemporaneous emissions change must be "creditable". A contemporaneous emissions increase for a given pollutant is not creditable if that increase was previously relied upon in the issuance of a PSD permit. EPA guidance is clear that emissions increases or decreases of a given pollutant considered in netting a source out of PSD applicability for that pollutant are not "relied upon" and thus remain creditable for future netting analyses. An emissions increase is creditable to the extent that the new level of actual emissions exceeds the old. An emissions decrease is creditable only to the extent that 1) the old level of actual or allowable emissions, whichever is lower, exceeds the new level of actual emissions; 2) it is federally enforceable; and 3) it has approximately the same qualitative significance for public health and welfare as that attributed to the increase from the particular change.

3.2 Affected Units at the Salt Lake City Refinery

All existing, non-modified emission units at the Salt Lake City Refinery were reviewed to determine if the project will result in an emissions increase. Units that will experience an emissions increase due to the project (i.e., be affected by the project) are presented in Table 3-2.

Table 3-2. Summary of Affected Emission Units

Emission Unit	New / Existing	Modified / Non-modified
Crude Unit Furnace H-101	Existing	Non-modified
UFU Furnace F-1	Existing	Non-modified
UFU Regeneration Heater F-15	Existing	Non-modified
FCCU/ CO Boiler	Existing	Modified
DDU Charge Heater F-680	Existing	Non-modified
DDU Rerun Reboiler F-681	Existing	Non-modified
Ultraformer Compressors K1s	Existing	Non-modified
Cooling Tower UU3	Existing	Modified
SRU/TGI	Existing	Non-modified
FGDU/SWS Flare	Existing	Non-modified
GHT Heater F-701	Existing	Non-modified
Cogeneration Unit CG1 and CG2	Existing	Non-modified
Loading Rack	Existing	Non-modified
New/Replaced Components	Existing	Modified
Tanks 206, 212, 242, 243, 291, 307, 321, 324, 328, 330, 331	Existing	Non-modified
Tank 188 (Black Wax Crude)	New	N/A
DDU Reactor (vented to South Flare during SSM events)	New	N/A
New Benzene Control Equipment (Thermal Oxidizer)	New	N/A

3.3 Emission Units Not Impacted by Project

The following major units at the Salt Lake City Refinery will not experience increased utilization as a result of implementing the proposed project scope:

- South Flare (PS #7): The additional DDU Reactor will vent to the South Flare during SSM events. For purposes of the NSR analysis, these emissions are accounted for separately. The project does not otherwise result in an increase in emissions at the South Flare.
- North Flare (PS #8): Emissions at the North Flare are independent of rate and will not increase as a result of the Black Wax Processing Project. No increase of venting to this flare is expected as the result of the Project.

- Emergency/Standby Sources: Inherently not affected by changes in process rate.
- Cooling Tower UU2: No equipment in the UU2 cooling water system is being modified nor is the circulation rate increasing as part of the proposed Project.

3.4 Project Emissions Increase Summary

Table 3-3 presents a summary of the Project emissions increase. The Project emissions increase are less than their respective NSR significant emission rates for NO_x, CO, PM, PM_{10}, $PM_{2.5}$, VOC, H_2SO_4, and the CO_2e trigger level of 75,000 tpy., therefore the Project does not trigger NSR for these pollutants or GHGs. The project emissions increase is greater than the NSR significant emission rate for SO_2. As a result, Tesoro has conducted a netting analysis to determine if the net emissions increase of SO_2 is greater than the significant emission rate, contained in Section 3.5.

Table 3-3. Black Wax Processing Project Emissions Increases (tpy)

Emission Unit	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	GHG (CO_2e)
Crude Unit Furnace H-101	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
FCCU/CO Boiler	24.93	158.85	6.93	5.70	4.90	3.89	0.00	6.74	38,230
Ultraformer Unit Furnace F-1	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0
UFU Regeneration Heater F-15	0.27	0.00	0.13	0.01	0.01	0.01	0.01	0.00	0
DDU Charge Heater F-680	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
DDU Rerun Reboiler F-681	0.46	0.00	1.60	0.15	0.15	0.15	0.10	0.00	0
SRU/TGI	1.12	0.00	0.94	0.09	0.09	0.09	0.07	0.00	882
FGDU/SWS (SRU) Flare	0.00	15.03	0.00	0.00	0.00	0.00	0.00	0.15	4
GHT Unit F-701	0.30	0.05	0.93	0.08	0.08	0.08	0.07	0.00	317
Ultraformer Compressors (K1s)	0.32	0.00	0.11	0.01	0.01	0.01	0.11	0.00	46
Cooling Tower UU3	0.00	0.00	0.00	3.09	1.42	0.01	0.00	0.00	0
Cogeneration Unit Turbines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Cogeneration Unit HRSGs	0.00	0.00	0.00	0.28	0.28	0.28	0.20	0.00	0
Product Loadout	0.00	0.00	0.00	0.00	0.00	0.00	8.03	0.00	0
Storage Tanks	0.00	0.00	0.00	0.00	0.00	0.00	2.39	0.00	0
New and Replaced Components	0.00	0.00	0.00	0.00	0.00	0.00	8.37	0.00	0
DDU Reactor (SSM events)	0.00	0.07	0.03	0.00	0.00	0.00	0.01	0.00	6
Thermal Oxidizer	0.94	0.07	0.79	0.07	0.07	0.07	0.59	0.00	0
Project Emissions Increase (tpy)	**28.34**	**174.07**	**11.46**	**9.47**	**7.00**	**4.58**	**19.96**	**6.90**	**39,485**
NSR significant emission rate (tpy)	40	40	100	25	15	10	40	7	75,000
Is Project Emissions Increase > SER?	No	Yes	No	No	No	No	No	No	No

3.5 PSD Netting Analysis

The following steps are performed in accordance with PSD netting requirements to determine if the net emissions increase of SO_2 is greater than the PSD significant emission rate (SER).

Step 1: Determine the emissions increase from the proposed project only.

The project emissions increase is summarized in Table 3-3. Netting analysis is only performed for SO_2 as it is the only pollutant with a project-related increase greater than the PSD SER.

Step 2: Determine the contemporaneous period.

The contemporaneous period begins on the date five years before construction commences on the proposed modification and ends on the date the emissions increase from the proposed modification occurs. Construction on the Black Wax Processing Project is expected to commence as early as May 1, 2012, therefore Tesoro is considering the contemporaneous period to begin on May 1, 2007.

Step 3: Sum the emissions change to determine the net emissions increase. Compare the net emissions increase to the PSD significant emission rate.

If the net emissions increase is less than the corresponding PSD significant emission rate, the project is not subject to PSD review. If the net emissions increase is greater than the corresponding PSD significant rate, the project is subject to PSD review.

See Table 3-4 for the contemporaneous project emission calculations. The list of contemporaneous projects was determined through a detailed review of all projects undertaken at the Salt Lake City Refinery since May 1, 2007. The increases in SO_2 emissions are conservatively based on permitted emission increases. Tesoro reserves the right to review these contemporaneous emission increases in the future.

Table 3-4. Contemporaneous Project SO_2 Emissions and NSR Applicability (tpy)

Project Name	SO_2 Emissions Change (tpy)	Notes
GHT Project	+19.24	Project completed.
BenSat Unit	+1.29	Unit under construction, startup will occur prior to May 1, 2012.
CONOx Project	--	See Section 2.5. The project is aggregated with the Black Wax Processing Project.
LPG Recovery Project	+0.003	Startup will occur prior to May 1, 2012.
UFU Scrubber	+0.05	Startup will occur prior to May 1, 2012.
FCCU Overhead Condensing Project	--	See Section 2.5. The project is aggregated with the Black Wax Processing Project.
Re-routing PDO to VRU	+1.84	Startup will occur prior to May 1, 2012.
SRU Tail Gas Unit	-259.39	Included in the scope of this project.
Netting Analysis: Sum of Contemporaneous Creditable Increases and Decreases Excluding Project Emissions Increase (tpy)	**-236.97**	
Project Emissions Increase (tpy)	174.07	See Table 3-3.
Net Emissions Increase [Project Emissions Increase + Netting Analysis CCI/CCD] (tpy)	-62.90	
NSR significant emission rate (tpy)	40	
Is Net Emissions Increase Greater than NSR significant emission rate?	**No**	

3.5.1 SRU Tail Gas Treatment Unit

As a separate contemporaneous project, Tesoro will install a tail gas treatment unit (TGTU) at its Sulfur Recovery Unit (SRU) to reduce SO_2 emissions. TGTUs are designed to convert additional sulfur compounds back into H_2S for recovery as elemental sulfur.

As the first step in the TGTU, a new small heater will heat hot oil that will be used to preheat the SRU tail gas to the hydrogenation reactor. The heated gasses, along with hydrogen, are then mixed and introduced to a hydrogenation reactor. In the reactor, all sulfur compounds will be reduced to

H_2S in an exothermic reaction. The gas will be cooled in a quench tower to a suitable temperature for amine treatment, and sour water is condensed from the stream. The gases will be compressed in a small blower, cooled, and routed to an amine absorber, and the treated gases will then be routed to the existing SRU Tail Gas Incinerator (TGI). The amine solution will be regenerated to release the absorbed acid gas which will be recycled to the SRU.

To accommodate the recycle gas from the TGTU, the existing undersized spare SRU air blower may be upgraded. Further, the TGTU will be installed such that gases may bypass the TGTU directly to the TGI in the event of a TGTU malfunction. To minimize emissions the TGTU will be designed for start-up prior to the SRU and shutdown following SRU shutdown.

3.6 PSD Applicability Determination

As previously noted, the Project emissions increase is less than the NSR significant emission rate for NO_x, CO, PM, PM_{10}, $PM_{2.5}$, VOC, H_2SO_4, and the CO_2e trigger level, therefore the Project does not trigger NSR for those pollutants. The net emissions increase is less than the NSR significant emission rate for SO_2, therefore the Project does not trigger NSR for SO_2.

3.6.1 "Reasonable Possibility" Requirements

On December 21, 2007, the US EPA promulgated updates to the federal PSD rules at 40 CFR 52.21(r)(6)(vi) that defines when an owner/operator of a major source is required to conduct recordkeeping and reporting when using the baseline-actual-to-projected-actual emissions increase calculation methodology. The Utah Air Quality Board has adopted the federal PSD rules as they existed in the Code of Federal Regulations on July 1, 2008, at R307-405.

A "reasonable possibility" occurs when the project is calculated to result in either:[21]

> *"(a) A projected actual emissions increase of at least 50 percent of the amount that is a "significant emissions increase," as defined under paragraph (b)(40) of this section (without reference to the amount that is a significant net emissions increase), for the regulated NSR pollutant; or*
>
> *(b) A projected actual emissions increase that, added to the amount of emissions excluded under paragraph (b)(41)(ii)(c) of this section, sums to at least 50 percent of the amount that is a "significant emissions increase," as defined under paragraph (b)(40) of this section (without reference to the amount that is a significant net emissions increase), for the regulated NSR pollutant. For a project for which a reasonable possibility occurs only within the meaning of*

[21] 40 CFR 52.21(r)(6)(vi)(*a*)-(*b*)

paragraph (r)(6)(vi)(b) of this section, and not also within the meaning of paragraph (r)(6)(vi)(a) of this section, then provisions (r)(6)(ii) through (v) do not apply to the project."

A summary of reasonable possibility applicability and requirements is shown in Table 3-5 below. Tesoro is required to complete a preconstruction determination (i.e., pre-project recordkeeping) for NO_x, SO_2, CO, PM, PM_{10}, $PM_{2.5}$, VOC, and H_2SO_4. Tesoro is also required to keep records of post-project annual actual emissions of NO_x, SO_2, and H_2SO_4. The project emissions increase of CO_2e is less than 75,000 tpy trigger level; therefore, GHG is not a regulated NSR pollutant for this project. Since GHG is not a regulated NSR pollutant for the project, reasonable possibility recordkeeping requirements do not apply.

Table 3-5. Summary of Reasonable Possibility Applicability and Requirements

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	GHG (CO_2e)
Project Emission Increase (tpy)	28.34	174.07	11.46	9.47	7.00	4.58	19.96	6.90	N/A
Demand Growth Exclusion (tpy)	29.71	28.26	96.55	49.95	44.47	37.68	2.26	4.41	
Project Emission Increase + Demand Growth Exclusion (tpy)	58.05	202.33	108.01	59.42	51.47	42.26	22.22	11.30	
PSD Significant Emission Rate (SER) (tpy)	40	40	100	25	15	10	40	7	
Is Project Emission Increase Greater than 1/2 of the PSD Significant Emission Rate?	**Yes**	**Yes**	No	No	No	No	No	**Yes**	
Is Project Emission Increase + Demand Growth Exclusion Greater than 1/2 of the PSD Significant Emission Rate?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	
Is Preconstruction Determination Required?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	
Is Recordkeeping of Annual Actual Emissions Required?	**Yes**	**Yes**	No	No	No	No	No	**Yes**	

The preconstruction requirements are as follows:[22]

> *"(i) Before beginning actual construction of the project, the owner or operator shall document and maintain a record of the following information:*
>
> *(a) A description of the project;*
>
> *(b) Identification of the emissions unit(s) whose emissions of a regulated NSR pollutant could be affected by the project; and*
>
> *(c) A description of the applicability test used to determine that the project is not a major modification for any regulated NSR pollutant, including the baseline actual emissions, the projected actual emissions, the amount of emissions excluded under paragraph (b)(41)(ii)(c) of this section and an explanation for why such amount was excluded, and any netting calculations, if applicable."*

This applicability analysis satisfies the preconstruction requirements. Beyond these preconstruction requirements, monitoring of future actual calendar-year annual emissions is required as described below.[23]

> *"(iii) The owner or operator shall monitor the emissions of any regulated NSR pollutant that could increase as a result of the project and that is emitted by any emissions unit identified in paragraph (r)(6)(i)(b) of this section; and calculate and maintain a record of the annual emissions, in tons per year on a calendar year basis, for a period of 5 years following resumption of regular operations after the change, or for a period of 10 years following resumption of regular operations after the change if the project increases the design capacity or potential to emit of that regulated NSR pollutant at such emissions unit."*

Post-project recordkeeping of NO_x, SO_2, and H_2SO_4 emissions from the existing emissions units affected by the project, and from which projected actual emission calculations are used in the preconstruction determination, is required to be maintained.

As discussed below in Section 3.7, the potential to emit of SO_2 and H_2SO_4 emissions at the FCCU will increase as a result of removal of the current 705 tpy SO_X emission limit. The design capacity or potential to emit of NO_x of the existing emission units affected by this requirement will not increase as a result of the project. Therefore, annual actual emissions recordkeeping of SO_2 and H_2SO_4 is required for a period of ten (10) calendar years and annual actual emissions recordkeeping of NO_x is required for a period of five (5) calendar years following resumption of regular operations after the change.

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[22] 40 CFR 52.21(r)(6)(i)

[23] 40 CFR 52.21(r)(6)(iii)

The reasonable possibility regulations are not completely clear with respect to treatment/inclusion of new emissions units. The provisions of (r)(6) apply only to existing emission units. It does not appear that future actual annual emissions recordkeeping would be required or allowed. However, as noted above, PSD applicability is inherently considered a project-wide determination and some representation of all project-affected emission units may be necessary for Tesoro's annual review of actual emissions. In an abundance of caution, Tesoro will maintain records of future actual calendar-year annual emissions from all emissions units affected by the project, regardless of whether the actual-to-projected-actual or actual-to-potential emissions calculation methodology is employed in the preconstruction determination.

Tesoro is required to review its actual emissions annually as follows:[24]

> *"(v) If the unit is an existing unit other than an electric utility steam generating unit, the owner or operator shall submit a report to the Administrator if the annual emissions, in tons per year, from the project identified in paragraph (r)(6)(i) of this section, exceed the baseline actual emissions (as documented and maintained pursuant to paragraph (r)(6)(i)(c) of this section), by a significant amount (as defined in paragraph (b)(23) of this section) for that regulated NSR pollutant, and if such emissions differ from the preconstruction projection as documented and maintained pursuant to paragraph (r)(6)(i)(c) of this section. Such report shall be submitted to the Administrator within 60 days after the end of such year. The report shall contain the following:*
>
> *(a) The name, address and telephone number of the major stationary source;*
>
> *(b) The annual emissions as calculated pursuant to paragraph (r)(6)(iii) of this section; and*
>
> *(c) Any other information that the owner or operator wishes to include in the report (e.g., an explanation as to why the emissions differ from the preconstruction projection)."*

Tesoro will review its future calendar-year actual emissions, beginning with the first calendar year after issuance of the AO, to determine if the actual emissions exceed the baseline actual emissions by a significant amount. If this occurs, it will also differ from the preconstruction projected as documented in this applicability analysis. In this event, Tesoro will submit a report within 60 days after the end of the calendar year.

[24] 40 CFR 52.21(r)(6)(v)

4.0 Regulatory Applicability and Compliance Demonstration

In addition to the PSD analysis detailed in Section 3.0, Tesoro has completed an applicability review of all other Federal and State air quality regulations as part of the air permit application process. Table 4-1 provides a summary of the major air quality programs that were reviewed for the project. Each regulation which requires explanation is described in the following sections. Certain aspects of the Project result in the triggering of new applicable requirements.

Table 4-1. Summary of Air Quality Regulatory Applicability for the Project

Report Section	Program Description	Regulatory Citation	Does This Project Trigger New Applicable Requirements?
---	National Ambient Air Quality Standards (NAAQS)	40 CFR 50	No
3.0	New Source Review (NSR)	40 CFR 52	No
4.1	New Source Performance Standards (NSPS)	40 CFR 60	Yes
4.2	National Emission Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR 61	Yes
4.2	NESHAPs for Source Categories	40 CFR 63	Yes
---	Risk Management Programs for Chemical Accidental Release Prevention	40 CFR 68	No
---	Title V Operating Permit	40 CFR 70	No
---	Acid Rain Requirements	40 CFR 72	No
---	Stratospheric Ozone Protection Requirements	40 CFR 82	No
---	**Utah State Rules**	**UAC R307**	---
4.1	Stationary Sources	R307-210	Yes
4.2	National Emission Standards for Hazardous Air Pollutants	R307-214	Yes
4.3	Ozone Nonattainment and Maintenance Areas: Control of Hydrocarbon Emissions in Petroleum Refineries	R307-326	No
4.4	Ozone Nonattainment and Maintenance Areas: Petroleum Liquid Storage	R307-327	No
4.5	Permit: New and Modified Sources	R307-401	Yes
4.6	Nonattainment and Maintenance Areas	R307-403	No
4.7	Permits: Major Sources in Attainment or Unclassified Areas (PSD)	R307-405	No

Report Section	Program Description	Regulatory Citation	Does This Project Trigger New Applicable Requirements?
4.8	Visibility	R307-406	No
4.9	Permits: Emissions Impact Analysis	R307-410	No
---	Permits: Fees for Approval Orders	R307-414	No
4.10	Permits: Ozone Offset Requirements in Davis and Salt Lake Counties	R307-420	No
4.11	Permits: PM_{10} Offset Requirements in Salt Lake County and Utah County	R307-421	No
4.12	Consent Decree	---	No
4.13	Approval Orders	---	No

4.1 R307-210: Stationary Sources

New Source Performance Standards (NSPS) are incorporated by reference into the UDAQ regulations. Applicability and compliance with Subparts Db, Dc, J/Ja, Kb, GGGa, NNN, and QQQ are discussed below in additional detail. Regulatory coverage for other subparts currently applicable to the facility (Subparts K, Ka, GG, and GGG as listed in Section III of the AO) will not change as a result of this project.

4.1.1 Subpart Db: Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

The affected facility to which Subpart Db applies is each steam generating unit, defined as a device that combusts any fuel or byproduct/waste and produces steam or heats any heat transfer medium, that commences construction, reconstruction, or modification after June 19, 1984, and has a heat input capacity greater than 100 MMBtu/hr. The CO Boiler is a steam generating unit that has not been constructed, reconstructed, or modified since June 19, 1984, and is therefore not currently subject to Subpart Db. The CO Boiler will not be modified or reconstructed as part of this Project. Therefore, this project does not trigger Subpart Db.

4.1.2 Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

Tesoro is proposing to add a convection section to the DDU process heaters (F-680 and F-681). In addition, the heaters will be changed from a single pass to a dual pass furnace design. The DDU Charge Heater F-680 is not a steam generating unit since it is used primarily to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst and therefore meets the definition of a “process heater” under Subpart Db. The physical changes to the

DDU Rerun Reboiler (F-681) do not increase in the maximum heat input capacity, and therefore do not result in an emission increase. Installation of the convection system is not a modification as defined under 40 CFR §60.14(a).

The project is not a reconstruction of the DDU Rerun Reboiler (F-681) since the fixed capital cost of the project is less than 50 percent of the current replacement cost of the facilities. The total cost of the project is estimated to be $875,000. The total replacement cost is estimated to be $6.5 million for the heater. The cost of the project is only 13% of the replacement value.

4.1.3 Subparts J/Ja: Standards of Performance for Petroleum Refineries

This project involves changes to the following units subject to Subpart Ja: FCCU/CO Boiler, the SRU, and the DDU Heaters F-680 and F-681. The applicability to Subpart Ja and compliance with Subparts J/Ja are described for each unit below.

4.1.3.1 FCCU/CO Boiler

In accordance with 40 CFR 60.100a, a new, modified, or reconstructed fluid catalytic cracking units is considered an affected facility subject to the NSPS Subpart Ja requirements. The NSPS regulation, at 40 CFR §60.14(a), defines a modification as a physical or operational change to the affected facility that is not specifically exempted and that results in an increase in the emissions rate to the atmosphere of any pollutant to which a standard applies (i.e., for NSPS Subpart Ja, SO_2, CO, PM, and NO_x for an FCCU). The physical or operational changes that are specifically exempted from being considered a modification are listed at 40 CFR §60.14(e). "Increase in emissions rate" in turn is defined pursuant to 40 CFR §60.14(b) as an increase in the maximum hourly emission rate of an applicable pollutant ("the NSPS Causality Test") from the affected facility.

In accordance with definition fluid catalytic cracking at 40 CFR 60.101a, the FCCU affected facility includes the follows:

> *". . . the riser, reactor, regenerator, air blowers, spent catalyst or contact material stripper, catalyst or contact material recovery equipment, and regenerator equipment for controlling air pollutant emissions and for heat recovery. When fluid catalyst cracking unit regenerator exhaust from two separate fluid catalytic cracking units share a common exhaust treatment (e.g., CO boiler or wet scrubber), the fluid catalytic cracking unit is a single affected facility."*

The wet gas compressor at the VRU is not included within this definition of the FCCU affected facility under Subpart Ja. It is located downstream of the FCCU fractionator, which is located downstream of the FCCU reactor. Thus, the wet gas compressor is not part of the FCCU affected facility under Subpart Ja.

Because the compressor is not a part of the affected facility, the upgrades to the compressor are not considered as part of the NSPS applicability determination.[25] In addition, the VRU work will result in an increase in the FCCU production capacity without a capital expenditure at the affected facility. Therefore, the work is therefore excluded from being considered a physical or operational change to the FCCU per 40 CFR §60.14(e)(2).

The "increase in emissions rate" associated with a given modification must take into account the project's affects on emissions from the combined operation of both the FCCU and the CO Boiler. To determine if the changes will result in an emissions rate increase, the operation (i.e., capacity) of the FCCU/CO Boiler prior to and following the modification must be defined. For purposes of this analysis, based upon EPA policy the following basis was used to define the FCCU/CO Boiler operations prior to and following the proposed changes planned for the project:

- The FCCU is assumed to be operating at its maximum capacity and most economic operation for a given fresh feed.

- The CO Boiler is assumed to be operating at their maximum physical capacity as defined by their supplemental firing rate.

Any operating parameters that may affect the mass emissions rate are assumed held constant to the maximum degree feasible (i.e., fresh feed characteristics, CO concentration in the FCCU overhead gas to the CO Boiler, operating rate of the wet gas compressor at the VRU).

The only changes to the affected facility are related to the FCCU riser upgrades. The riser upgrades do not increase the design feed rate to the FCCU. Simulations have confirmed that the maximum coke burn rate may decrease due to the increased residence time. The riser upgrades are being implemented to increase residence time and to increase the value of the product slate from the FCCU. The FCCU is currently constrained by maximum riser temperature due to cracking concerns in the winter, which will not be relieved by the proposed FCCU riser upgrades. During the summer, the FCCU is currently constrained by the wet gas compressor at the VRU downstream from the FCCU affected facility. Increases in production at the FCCU as a result of this Project are a result of the wet gas compressor upgrade at the VRU, which does not factor into this analysis.

[25] i.e., ADI Control Number 0800044; 9/7/88 letter from EPA Region 11 to Mobil Oil Corporation.

The project will not increase the amount of sulfur (in the coke) deposited on the catalyst. The project will also not increase the amount of reduced nitrogen compounds in the FCCU overhead gas. Since there are no increases in the design rates of coke burn or gas firing, there are no increases in the potential hourly emissions of PM, CO, NO_x, or SO_2.

Tesoro also considered a scenario where a decrease in coke burn rate occurs at the FCCU's maximum feed rate. A decrease in coke burn would result in a higher required firing rate at the CO Boiler to maintain the destruction efficiency and steam production rate. Firing of additional fuel gas in the CO Boiler results in less NO_x emissions since NO_x formation from the reduced nitrogen compounds is greater than NO_x formation from fuel gas firing. Similarly, emissions of PM, CO, and SO_2 from fuel gas firing are less than from coke burning. For these reasons, the Project is not an NSPS modification.

The project is not a reconstruction since the fixed capital cost of the project is less than 50 percent of the current replacement cost of the facility. The total cost of the project is estimated to be $14.0 million. The replacement cost of the facility was estimated to be $89.6 million in 2008. The cost of the project is only 16% of the replacement value.

Tesoro will continue to comply with Conditions II.B.2.d-f based on NSPS Subpart J, which requires that emissions of SO_X shall not exceed 9.8 lb/1,000 lb coke burned on a seven day average. Tesoro will continue to comply with the monitoring requirements listed in Condition II.B.2.d.1, including limits on sulfur content in the feed, temperature of the FCCU regenerator, oxygen content of the FCCU regenerator, CO concentration in the FCCU regenerator, and CO emissions to the atmosphere. These limits were established under a range of full and partial burn operating conditions as part of an approved Alternative Monitoring Plan.

The CO Boiler is currently subject to Subpart J and is not subject to Subpart Ja as a fuel gas combustion device. The Project is not a modification or reconstruction of the CO Boiler as defined in 40 CFR 60.14 since there are no proposed physical changes to the unit; therefore, the CO Boiler will not become subject to Subpart Ja as a result of this project.

4.1.3.2 Sulfur Recovery Unit

Physical changes will be made to the SRU affected facility as part of the Project, including installation of a TGTU. There will be no increase in the maximum hourly emission rate of SO_2 as a result of the Project, therefore the project is not a modification under NSPS Ja. In addition, the design capacity will continue to be less than 20 long tons per day following changes made at the unit.

Tesoro is still evaluating whether the project is a reconstruction under NSPS Ja. Tesoro will supplement this application when sufficient cost information is available to make this determination.

4.1.3.3 DDU Heaters

While a new convection section will be added to the existing F-680 and F-681 process heaters and the will change from a single pass to dual pass furnace design, the design duty will not be increasing. Thus, the heaters will not experience an emissions increase and as such will not be modified under NSPS Ja.

The project is not a reconstruction since the fixed capital cost of the project is less than 50 percent of the current replacement cost of the facilities. The total cost of the project is estimated to be $875,000. The total replacement cost is estimated to be $13 million for the two heaters. The cost of the project is only 7% of the replacement value.

4.1.4 Subpart Kb: Standards of Performance for Volatile Organic Liquid Storage Vessels for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

The replacement Tank 188 will be subject to NSPS Subpart Kb since its volume will be greater than 151 m^3 and the maximum true vapor pressure is greater than 3.5 kilopascals. Tesoro will comply with the emission standards, testing, monitoring, recordkeeping, and reporting requirements of the rule.

An internal floating roof will be installed in Tank 206 to accommodate Black Wax crude storage. As a result of this modification, Tank 206 will become subject to NSPS Subpart Kb.

4.1.5 Subpart GGGa: Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006

Applicability of the process fugitive components and the wet gas compressor to Subpart GGGa are discussed below.

4.1.5.1 Process Fugitive Components

Process fugitive components in VOC service at the Salt City Refinery are subject to NSPS Subpart VV pursuant to MACT Subpart CC. The overlap conditions in at 40 CFR 63.140(p) state the following:

> *"(p) Overlap of subpart CC with other regulations for equipment leaks. After the compliance dates specified in paragraph (h) of this section equipment leaks that are also subject to the provisions of 40 CFR parts 60 and 61 are required to comply only with the provisions specified in this subpart."*

This condition may be interpreted that the units which will add and replace components as a result of the Project (including the FCCU, VRU, DDU, Crude Unit, TGTU, CO Boiler, Wastewater, Dewaxing), which contain components in organic HAP service, cannot be subject to Subpart GGGa regardless of changes made in the units. Due to the current uncertainty in applying this overlap provision to regulatory applicability under Subpart GGGa, Tesoro has considered applicability of Subpart GGGa under the modification provisions under 40 CFR 60.14, which require that the physical change results in an emissions increase at the affected facility, which is calculated at maximum capacity before and after the change. The affected facility in this case is the sum of all equipment (components) at each of the affected units.

While exact component counts on a unit by unit basis are not currently available, the total number of components added is not expected to result in triggering a modification under NSPS Subparts GGGa/VVa, Tesoro is assuming that the changes to the affected process units will not trigger modification under Subpart GGGa/VVa. Tesoro will review this assumption when detailed drawings are made available. In the event that modification is triggered under Subpart GGGa/VVa, Tesoro will provide updated information to UDAQ.

4.1.5.2 Wet Gas Compressor

Compressors are a separate affected facility under Subpart GGGa. Tesoro is revamping its wet gas compressor at the VRU. The project is not a reconstruction since the fixed capital cost of the project is less than 50 percent of the current replacement cost of the facilities. The total cost of the project is estimated to be $1 million. The replacement cost of the compressor is estimated to be $16 million. The cost of the project is only 6% of the replacement value.

4.1.6 Subpart NNN: Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations

Subpart NNN of 40 CFR 60 applies to distillation units in the SOCMI industry that process organic chemicals as a product, co-product, by-product, or intermediate. The affected facility for a “distillation unit” includes the distillation column, reboilers, associated condensers, and the vent recovery system.

As part of this Project, distillation units will experience a physical change. Tesoro is presuming that the distillation units, which will undergo modification as defined by §60.14(b) of Subpart A, and will become subject to Subpart NNN. Tesoro reserves the right to re-examine applicability under §60.14 with UDAQ.

Tesoro proposes to comply with the monitoring, reporting and recordkeeping requirements of Subpart NNN via an alternative monitoring plan (AMP), which closely mirrors the standards of 40 CFR 60 Subpart RRR – Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes. The EPA has already approved several AMPs for similarly affected distillation units producing propane and butane at other petroleum refineries throughout the United States. Tesoro expects to request approval of an AMP prior to completion of the changes.

4.1.7 Subpart QQQ: Standards of Performance for VOC Emissions from Petroleum Refinery Wastewater Systems

At this time, detailed design drawings are not available for wastewater system modifications related to the Project. Tesoro is uncertain at this time whether a modification to an affected facility will occur as part of the Project. Tesoro will review the detailed drawings when they are available and in the event that modification is triggered under Subpart QQQ, Tesoro will provide the required notifications to UDAQ.

4.1.8 New Source Performance Standards for Greenhouse Gases

On December 21, 2010, the US EPA signed an agreement with a number of organizations that requires EPA to sign a proposed rule by December 10, 2011 that includes standards of performance for GHGs for affected facilities at refineries. Tesoro will review regulatory applicability with these future rules for potentially affected facilities that commence construction, modification, or reconstruction after the effective date. Because the actual time frame and content of the upcoming rulemaking is unknown, Tesoro cannot state for certain if new or modified units associated with this project will trigger the new standards.

4.2 R307-214: National Emission Standards for Hazardous Air Pollutants

MACT and NESHAP standards are incorporated by reference into the UDAQ rules. Each currently applicable standard relevant to the Project is discussed below.

4.2.1 40 CFR 61 Subpart FF: National Emission Standard for Benzene Waste Operations

Tesoro anticipates that this Project may increase the total annual benzene (TAB) quantity to greater than 10 megagrams per year. Therefore, Tesoro will comply with the 6BQ option of Subpart FF when the quantity exceeds 10 megagrams per year.

4.2.2 40 CFR 63 Subpart CC: National Emission Standards for Hazardous Air Pollutants From Petroleum Refineries

Tesoro will continue to comply with Subpart CC at its existing emission units. The replacement Tank 188 will be subject to Subpart CC. Tanks which are subject to NSPS Subpart Kb are required to comply only with the requirements of NSPS Subpart Kb under the overlap provisions in §63.640(n).

The new and replaced components will also be subject to requirements under Subpart CC.

4.2.3 40 CFR 63 Subpart UUU: National Emission Standard for Hazardous Air Pollutants for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units

The FCCU and SRU are currently subject to 40 CFR 63 Subpart UUU. Tesoro will continue to comply with the emission standards and other requirements of this rule. The FCCU and SRU will not be reconstructed as part of this project.

Tesoro is installing a new bypass line at the FCCU. Tesoro will comply with the requirements of Subpart CC for the new bypass line.

4.2.4 40 CFR 63 Subpart EEEE: National Emission Standard for Hazardous Air Pollutants: Organic Liquids Distribution (Non-gasoline)

Tesoro has evaluated the regulatory applicability of 40 CFR 63 Subpart EEEE "National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)" to the new Black Wax unloading rack. Subpart EEEE applies to an "organic liquids distribution (OLD) operation" which is defined as:

> *"… the combination of activities and equipment used to store or transfer organic liquids into, out of, or within a plant site regardless of the specific activity being performed. Activities include, but are not limited to, storage, transfer, blending, compounding, and packaging."*

The definition of "organic liquid" includes "any crude oils downstream of the first point of custody transfer." Black wax is an organic liquid by this definition.

The affected source under Subpart EEEE is the "collection of activities and equipment used to distribute organic liquids into, out of, or within a facility that is a major source of HAP." The source is composed of certain equipment: storage tanks, transfer racks, equipment leaks, transport vehicles, and containers. However, under §63.2338(c), if the equipment is "part of an affected source under another 40 CFR part 63 national emission standards for hazardous air pollutants (NESHAP)," then it is excluded from the affected source under Subpart EEEE. The Tesoro refinery is subject to 40 CFR 63 Subpart CC, which covers the equipment otherwise regulated by Subpart EEEE except for unloading racks, since Subpart CC regulates loading rack emissions (i.e., gasoline loading rack, marine tank vessel loading operations) but not equipment that involves unloading organic liquids. This is consistent with an ODEQ determination from January 2011 for a similar project at Holly Refining.[26]

The new Black Wax unloading rack is considered a "transfer rack" which is defined as:

> *"… a single system used to load organic liquids into, or unload organic liquids out of, transport vehicles or containers. It includes all loading and unloading arms, pumps, meters, shutoff valves, relief valves, and other piping and equipment necessary for the transfer operation. Transfer equipment and operations that are physically separate (i.e., do not share common piping, valves, and other equipment) are considered to be separate transfer racks."*

The unloading rack is exempt from all requirements under Subpart EEEE pursuant to §63.2343 other than documentation as follows:

> *"This section establishes the notification, recordkeeping, and reporting requirements for emission sources identified in §63.2338 that do not require control under this subpart (i.e., under paragraphs (a) through (e) of §63.2346). Such emission sources are not subject to any other notification, recordkeeping, or reporting sections in this subpart, including §63.2350(c), except as indicated in paragraphs (a) through (d) of this section.*
>
> *(a) For each storage tank subject to this subpart having a capacity of less than 18.9 cubic meters (5,000 gallons) and for each transfer rack subject to this subpart that only unloads organic liquids (i.e., no organic liquids are loaded at any of the transfer racks), you must keep documentation that verifies that each storage tank and transfer rack identified in paragraph (a) of this section is not required to be controlled. The documentation must be kept up-to-date (i.e., all such emission sources at a facility are identified in the documentation regardless of when the documentation was last compiled) and must be in a form suitable and readily available for expeditious inspection and review according to §63.10(b)(1), including records stored in electronic form in a separate location. The documentation may consist of identification of the tanks and transfer racks identified in paragraph (a) of this section on a plant site plan or process and instrumentation diagram (P&ID)."*

Therefore, maintaining documentation that the transfer rack only unloads organic liquids serves as compliance with Subpart EEEE. No other notifications or compliance obligations are required for this NESHAPs.

4.2.5 40 CFR 63 Subpart DDDDD: Boiler MACT

On March 21, 2011, EPA issued final standards for industrial, commercial, and institutional boilers and process heaters (Boiler MACT). However, on May 16, 2011, EPA administrator Lisa Jackson signed an action delaying the effective date of the rule until an undetermined future date. Tesoro will

[26] ftp://www.deq.state.ok.us/DEQ%20Public/AQD/Issued_Permits/2007XXX/2007005-a14.doc

comply with Boiler MACT as applicable for affected process heaters following the final resolution to the current regulatory stay.

4.3 R307-326: Ozone Nonattainment and Maintenance Areas: Control of Hydrocarbon Emissions in Petroleum Refineries

Rule R307-326 requires control of various VOC sources at petroleum refineries. Tesoro will comply with the provisions of this rule by:

1. Venting the DDU reactor to a flare during process unit turnarounds, and
2. Monitoring leaks from existing, new, and replacement fugitive components.

A bypass of the CO Boiler will be installed routing gases from the FCCU regenerator to a new quench system and then to the ESP, bypassing the CO Boiler. The quench system will be used to control the temperature of the gas stream to maintain ESP performance. This bypass would be used in the event of issues at the CO Boiler requiring maintenance and/or shutdown. Tesoro requests approval to install and operate this bypass since Tesoro would not comply with R307-326-7 during these bypass events.

4.4 R307-327: Ozone Nonattainment and Maintenance Areas: Petroleum Liquid Storage

Rule R307-207 requires tanks with a capacity greater than 40,000 gallons that are used to store volatile petroleum liquids with a true vapor pressure greater than 1.52 psia to be fitted with control equipment. Black Wax crude has a true vapor pressure of 1.0 psia.

Black Wax crude will be stored in the replacement Tank 188 and Tank 206. These tanks are therefore not subject to control requirements under R307-327.

4.5 R307-401: Permit: New and Modified Sources

Rule R307-401-3(b) requires submittal of an NOI to "make modifications or relocate an existing installation which will or might reasonably expected to increase the amount or change the effect of, or the character of, air contaminants discharged, so that such installation may be expected to become a source or indirect source of air pollution." The Project may increase the amount of air contaminants discharge from multiple emission units. Rule R307-401-5 requires submittal of an NOI, which must contain specific information related to the process, nature of emissions, control device(s), and regulatory applicability and compliance. Refer to Section 5.0 for a summary of compliance with the NOI requirements.

4.5.1 BACT

Rule 307-401-5(d) permits the issuance of an approval order if it is determined that the pollution control for emissions is at least best available control technology (BACT). A BACT review is required for new emission units and existing emission units where there is a physical modification and an increase in emissions.

Tesoro has conservatively considered BACT for the FCCU for emissions of particulate ($PM_{10}/PM_{2.5}$), NO_X, and SO_2 since there is expected to be an increase in actual emissions associated with the Project. A BACT analysis was recently conducted (2007) for the FCCU as part of the minor modifications to the FCCU to improve reliability (N0335-028). Continued operation of the ESP was selected as BACT for particulate emissions. The use of additional necessary SO_X reducing catalyst to meet NSPS limits was selected as BACT for SO_2 emissions. Additional NO_X control equipment would not be economically feasible; therefore Tesoro will continue to comply with its NO_X emission limit. Tesoro proposes to continue using these control technologies as BACT for the FCCU.

Tesoro proposes to install a TGTU at the SRU to reduce facility SO_2 emissions. Tesoro considers the TGTU to be BACT for SO_2 emissions from the SRU.

Tesoro will install an internal floating roof on the replacement Black Wax Tank 188 to reduce VOC emissions. Tesoro will also install an internal floating roof on Tank 206 to reduce VOC emissions.

The Cooling Tower UU3 has a drift eliminator rated at 0.005% and the VOC emissions will controlled to comply with heat exchange system requirements under 40 CFR 63 Subpart CC.

4.6 R307-403: Nonattainment and Maintenance Areas

R307-403 applies to major new sources or major modifications to be located in a nonattainment area. The proposed project is neither a new major source nor a major modification as defined in R307-101-2 since the actual emissions increase is less than the significant emission rate (SER) thresholds. Refer to Section 3.6 for a summary of this determination.

4.6.1 R307-403-5: Offsets: PM_{10} Nonattainment Area

Emission offsets are required if the combined allowable emission increase of PM_{10}, SO_2, and NO_x exceeds 25 tons per year. Refer to Section 4.13.1 for discussion of the changes in potential emissions as a result of the Project. The combined allowable emission increase from the project is zero (0) tons per year since the SIP caps will not increase. Therefore, no emission offsets are required.

4.7 R307-405: Permits: Major Sources in Attainment or Unclassified Areas (PSD)

This project is not a major modification and is not subject to the PSD program as described in Section 3.0. Refer to Section 3.6 for a summary of this determination. Tesoro has demonstrated compliance with all applicable requirements with the submission of this NOI. Therefore the requirements of R307-405 are not applicable to this proposed project.

4.8 R307-406: Visibility

This project is not a new major source or a major modification; therefore the provisions of this rule are not applicable.

4.9 R307-410: Permits: Emissions Impact Analysis

Pursuant to R307-410-4, dispersion modeling is required for increases in the total controlled emission rate of attainment pollutants (NO_x and CO for the SLC refinery) in an amount greater or equal to values given in Table 1 of the rule. For these pollutants, the thresholds given in Table 1 are equal to the SERs. Dispersion modeling is not required since the increases in emissions of NO_x and CO are less than the SERs.

4.9.1 R307-410-5: Ambient Air Impacts for Hazardous Air Pollutants

The requirements of R307-410-5 do not apply to installations which are subject to or are scheduled to be subject to an emission standard promulgated under 42 USC 7412 at the time the NOI is submitted. As described in Section 4.2, the FCCU, SRU, Tank 188, and new components are all subject to standards under 40 CFR 63 Subparts CC or UUU. The requirements of R307-410-5 do not apply to the project.

Actual HAP emission increases associated with the project include coke burn emissions, fuel gas combustion emissions, storage tank emissions, and gasoline loadout emissions. Table 4-2 presents a summary of actual HAP emission increases. There are no increases in potential emissions of HAPs as a result of the project. Refer to Attachment B for detailed HAP emission calculations.

Table 4-2. Project Actual HAP Emissions Increase Summary

HAP	Project Actual Emissions Increase lb/yr
Acetaldehyde	38.63

HAP	Project Actual Emissions Increase lb/yr
Acrolein	2.11
Benzene	154.85
Biphenyl	0.12
1,3-Butadiene	9.77E-02
Dichlorobenzene	1.59
Ethylbenzene	3.52
Formaldehyde	99.48
Hexane	2,730.09
Isopropyl benzene	0.00E+00
Naphthalene	3.68
Phenol	22.67
Toluene	150.57
1,2,4-Trimethylbenzene	0.95
2,2,4-Trimethylpentane	30.32
Xylenes	76.00
POM	1.29
Antimony	1.74
Arsenic	0.35
Beryllium	0.16
Cadmium	1.46
Chromium	2.14
Cobalt	1.36
Lead	0.49
Manganese	13.12
Mercury	0.35
Nickel	58.02
Selenium	3.17
Hydrochloric Acid	3,384.41
Carbon disulfide	1.17
Hydrogen cyanide	1,877.39
Total	**8,661.30**

4.10 R307-420: Permits: Ozone Offset Requirements in Davis and Salt Lake Counties

The SLC Refinery is located in a maintenance area for ozone. Emission offsets are required for any new major source or major modification of VOC or NO_x. The project is neither a new major source nor a major modification for VOC or NO_x, therefore offsets are not required.

4.11 R307-421: Permits: PM_{10} Offset Requirements in Salt Lake County and Utah County

Emission offsets are required if the combined allowable emission increase of SO_2 and NO_x exceeds 25 tons per year. The combined allowable emission increase from the project is zero (0) tons per year as described in Section 4.13.1. Therefore, no emission offsets are required.

4.12 Consent Decree - United States, et.al. v. BP Exploration & Oil, et. al., Civil Action No. 2:96 CV 095 RL

On August 29, 2001 BP Exploration entered into a Consent Decree with the US EPA covering eight refineries including the Salt Lake City and Mandan refineries. When Tesoro purchased the Salt Lake and Mandan refineries from BP, Tesoro assumed responsibility for the provisions of the consent decree as they related to the two facilities. This project is not being undertaken to comply with any provisions of the consent decree. Tesoro will continue to comply with the provisions of the consent decree after implementation of the project.

4.13 Approval Order

Tesoro will continue to comply with the conditions of its issued Approval Orders (DAQE-AN0103350051-11 for the refinery and DAQE-378-96 for the transport loading rack). Facility potential emissions are addressed in Section 4.13.1 and demonstration of compliance with the emission caps (Conditions II.A.20-22) in Section 4.13.2.

4.13.1 Changes in Potential Emissions

There will be an increase in PTE of SO_2 at the FCCU as a result of the Project. The FCCU is a member of the emission cap in Condition II.A.20. Tesoro is not proposing any increase in the emission cap, and will continue to comply with the cap as described in Section 4.13.2 below. There will be no increase in PTE at any other existing emission unit affected by the Project.

Installation of the new emission units (replaced Black Wax crude Tank 188, the new DDU reactor, and the thermal oxidizer) at the refinery will result in an increase in potential emissions. Potential emissions from the DDU reactor are negligible (<0.01 tons per year of each criteria pollutant). Tesoro requests that the thermal oxidizer be included in the NO_x, SO_2, and PM_{10} SIP caps. Potential emissions of the new units are shown on Table 3-3.

4.13.2 Compliance with Emission Caps

Tesoro is subject to emission caps for SO_2, NO_x, and PM_{10} per Conditions II.A.20-22. A summary of projected emissions after the Project in comparison with these emission caps is presented in

Table 4-3. It is important to note that the PM_{10} emissions cap was added based on only filterable PM_{10} emissions, therefore the calculations provided in this NOI are not consistent with the method of compliance demonstration. For gas combustion, an emission factor of 7.6 lb/MMscf per AP-42 is used instead of 5 lb/MMscf per the Approval Order. For the FCCU, condensable emissions make up 48.77 tons of the total projection. Taking these factors into account, the total projected filterable PM_{10} emissions are 63.01 tpy. Tesoro will continue to comply with the SO_2, NO_x, and PM_{10} emission caps.

Table 4-3. Compliance with Refinery Emission Caps

Source	SO_2 Projected Emissions (tpy)	NO_x Projected Emissions (tpy)	PM_{10} Projected Emissions (tpy)	Filterable PM_{10} Projected Emissions (tpy)
Crude Unit Furnace H-101	0.50	4.27	0.49	0.32
FCCU/CO Boiler	0.66	5.43	0.65	0.43
Ultraformer Unit Furnace F-1	0.17	83.90	7.92	5.21
UFU Regeneration Heater F-15	4.97	44.16	4.89	3.22
DDU Charge Heater F-680	4.14	21.34	4.08	2.68
DDU Rerun Reboiler F-681	0.66	5.43	0.65	0.43
GHT Unit F-701	762.25	174.00	96.55	47.79
Ultraformer Compressors (K1s)	3.48	52.99	3.43	2.26
Cogeneration Unit Turbines	0.22	2.79	0.21	0.14
Cogeneration Unit HRSGs	0.01	15.77	0.38	0.25
Total Emissions	**777.05**	**410.08**	**119.27**	**62.73**
Emission Cap	**1,637**	**598**	**95.3** [A]	**95.3**

[A] The PM_{10} cap is based on calculations of only filterable PM_{10}. The PM_{10} emission calculations in this application include both filterable and condensable PM_{10} as required by federal PSD regulations.

4.14 Summary and Conclusions

A summary of the regulatory conclusions in this Notice of Intent is as follows:

- The Project is not a major modification under NSR since the project emissions increases of NO_x, CO, PM, PM_{10}, $PM_{2.5}$, VOC, H_2SO_4, are less than the significant emission rates, the CO_2e level is less than the trigger, and the net emission increase of SO_2 is less than the significant emission rate.
- Tesoro is required to keep records of post project actual emissions of SO_2 and H_2SO_4 for 10 years and of NO_x emissions for 5 years following completion of the Project.
- The Project does not include any modifications or reconstructions of existing units as defined under NSPS Subparts Db, Dc, Ja, or GGGa.
- A modification under NSPS Subpart NNN for distillation columns will occur, and Tesoro will submit an AMP to comply with the regulation.
- The new Tank 188 will be subject to NSPS Subpart Kb and MACT Subpart CC.
- Tank 206 will become subject to NSPS Subpart Kb as a result of modifications made to the tank.
- Tesoro will construct new benzene control equipment to comply with 40 CFR 61 Subpart FF.
- Tesoro is subject to 40 CFR 63 Subpart EEEE at its Black Wax crude unloading facility, and will comply by maintaining records that the rack will only unload organic liquids.

5.0 Summary of NOI Requirements for Project

Table 5-1 provides a summary of how this NOI complies with the specific requirements of Rule R307-401-5(2).

Table 5-1. Summary of NOI Requirements

Requirement	Section Reference for Information Provided
(a) A description of the nature of the processes involved; the nature, procedures for handling and quantities of raw materials; the type and quantity of fuels employed; and the nature and quantity of finished product.	Section 2.0
(b) Expected composition and physical characteristics of effluent stream both before and after treatment by any control apparatus, including emission rates, volume, temperature, air contaminant types, and concentration of air contaminants.	Attachment B for emission rates.
(c) Size, type and performance characteristics of any control apparatus.	Section 2.0
(d) An analysis of best available control technology for the proposed source or modification. When determining best available control technology for a new or modified source in an ozone nonattainment or maintenance area that will emit volatile organic compounds or nitrogen oxides, the owner or operator of the source shall consider EPA Control Technique Guidance (CTG) documents and Alternative Control Technique documents that are applicable to the source. Best available control technology shall be at least as stringent as any published CTG that is applicable to the source.	Section 4.5.1
(e) Location and elevation of the emission point and other factors relating to dispersion and diffusion of the air contaminant in relation to nearby structures and window openings, and other information necessary to appraise the possible effects of the effluent.	Attachment A – location provided – other info not needed since modeling is not required.
(f) The location of planned sampling points and the tests of the completed installation to be made by the owner or operator when necessary to ascertain compliance.	Not applicable – no new testing is necessary to demonstrate compliance.
(g) The typical operating schedule.	Section 2.0

Requirement	Section Reference for Information Provided
(h) A schedule for construction.	Section 2.4
(i) Any plans, specifications and related information that are in final form at the time of submission of notice of intent.	No plans or specifications are in final form at the time of this submission.
(j) Any additional information required by:	
(i) R307-403, Permits: New and Modified Sources in Nonattainment Areas and Maintenance Areas;	(i) Section 4.6
(ii) R307-405, Permits: Major Sources in Attainment or Unclassified Areas (PSD);	(ii) Section 4.7
(iii) R307-406, Visibility;	(iii) Section 4.8
(iv) R307-410, Emissions Impact Analysis;	(iv) Section 4.9
(v) R307-420, Permits: Ozone Offset Requirements in Davis and Salt Lake Counties;	(v) Section 4.10
(vi) R307-421, Permits: PM10 Offset Requirements in Salt Lake County and Utah County.	(vi) Section 4.11
(k) Any other information necessary to determine if the proposed source or modification will be in compliance with Title R307.	Refer to Section 4.0 for a complete analysis.

Attachment A

Site Diagram

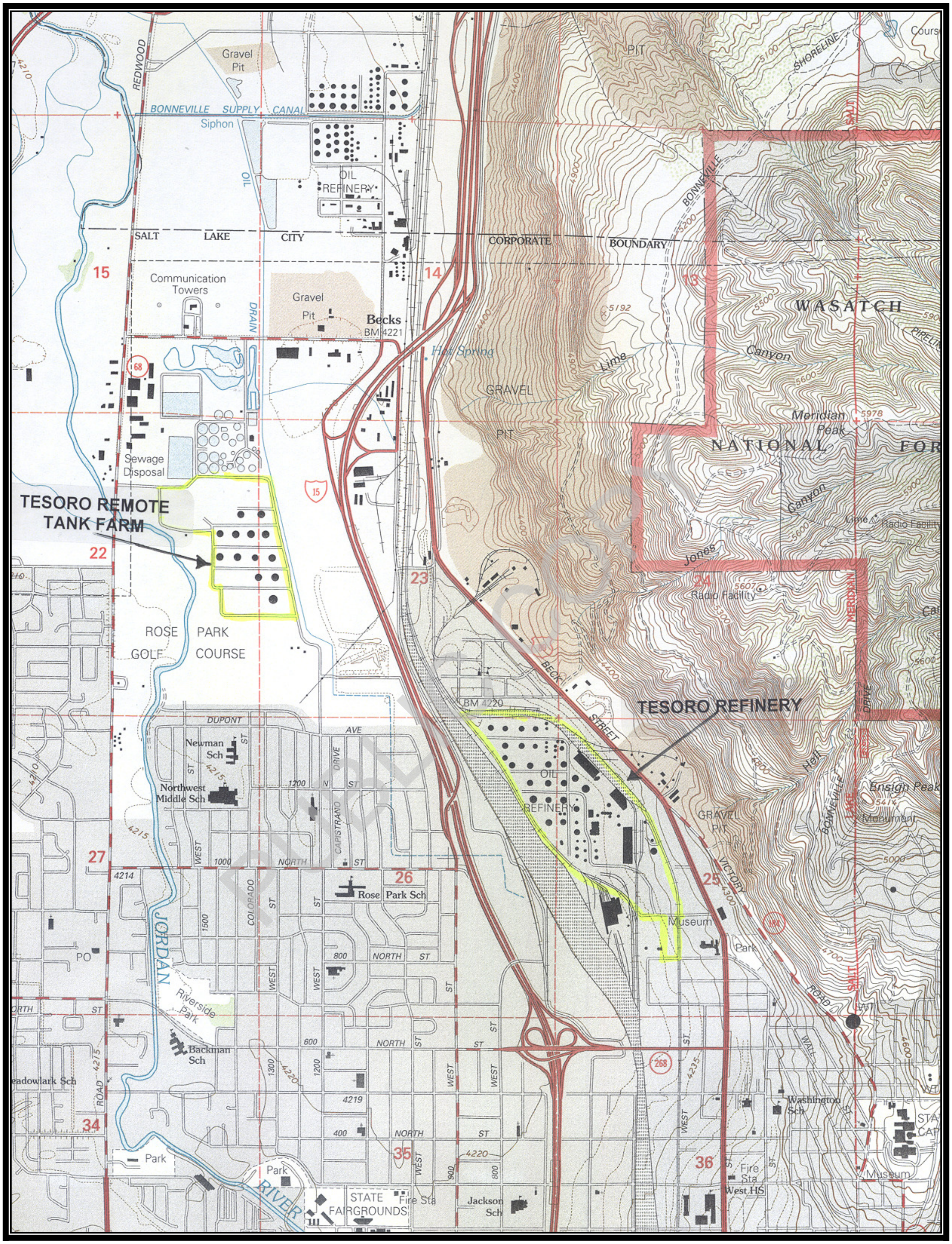
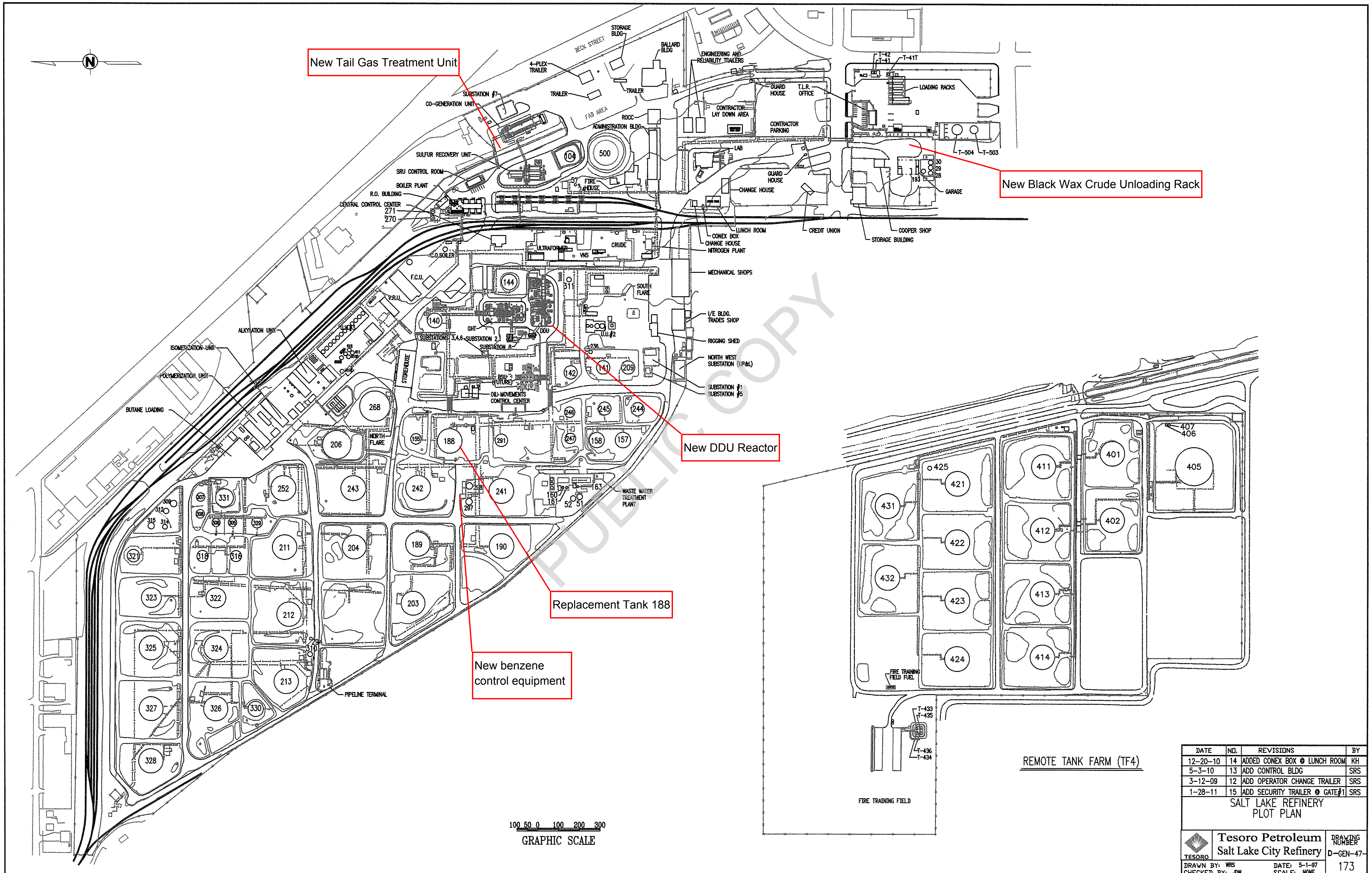


Figure A-1
Refinery Location Map


New Tail Gas Treatment Unit
New Black Wax Crude Unloading Rack
New DDU Reactor
Replacement Tank 188
New benzene
control equipment
PUBLIC COPY
N
SULFUR RECOVERY UNIT
SRU CONTROL ROOM
BOILER PLANT
R.O. BUILDING
CENTRAL CONTROL CENTER
CO-GENERATION UNIT
SUBSTATION #7
FAB AREA
ADMINISTRATION BLDG.
ROCC
ENGINEERING AND RELIABILITY TRAILERS
CONTRACTOR LAY DOWN AREA
CONTRACTOR PARKING
GUARD HOUSE
T.L.R. OFFICE
LOADING RACKS
T-504
T-503
GARAGE
COOPER SHOP
STORAGE BUILDING
CREDIT UNION
LUNCH ROOM
CONEX BOX
CHANGE HOUSE
NITROGEN PLANT
MECHANICAL SHOPS
SOUTH FLARE
I/E BLDG. TRADES SHOP
RIGGING SHED
NORTH WEST SUBSTATION (UP&L)
SUBSTATION #1
SUBSTATION #5
WASTE WATER TREATMENT PLANT
ALKYLATION UNIT
ISOMERIZATION UNIT
POLYMERIZATION UNIT
BUTANE LOADING
STOREHOUSE
NORTH FLARE
OIL MOVEMENTS CONTROL CENTER
PIPELINE TERMINAL
FIRE TRAINING FIELD
FIRE TRAINING FIELD FUEL
REMOTE TANK FARM (TF4)
100 50 0 100 200 300
GRAPHIC SCALE
DATE | NO. | REVISIONS | BY
12-20-10 | 14 | ADDED CONEX BOX @ LUNCH ROOM | KH
5-3-10 | 13 | ADD CONTROL BLDG | SRS
3-12-09 | 12 | ADD OPERATOR CHANGE TRAILER | SRS
1-28-11 | 15 | ADD SECURITY TRAILER @ GATE #1 | SRS
SALT LAKE REFINERY
PLOT PLAN
Tesoro Petroleum
Salt Lake City Refinery
DRAWING NUMBER D-GEN-47-173
DRAWN BY: WRS
CHECKED BY: JDW
DATE: 5-1-97
SCALE: NONE

Attachment B

Emission Calculations

Emission calculations for each regulated NSR pollutant were completed for all new emission units and existing, non-modified emission units that are associated with the Black Wax Processing Project. Section B.1 summarizes the calculations of potential emissions for new emission units associated with the Project. Section B.2 summarizes the actual-to-projected-actual for existing emission units that are associated with the Project. Refer back to Section 3.4 for a comparison of the project emissions increase to the NSR significant emission rates.

B.1 Emissions from New Equipment

Emission calculations for the replacement Tank 188, the DDU reactor, and new and replaced fugitive components in VOC service are described below. Refer to Attachment B for details of these calculations.

B.1.1 Tank 188 (Black Wax Crude)

The potential emissions from the replacement Tank 188 are calculated using EPA's TANKS 4.09d software. Final design information is not available, therefore the number of fittings have been estimated using TANKS 4.09d default values.

B.1.2 DDU Reactor (Vented to South Flare during SSM Events)

The new DDU reactor will be vented to the South Flare during startup, shutdown, and malfunction events. To estimate these emissions, it is assumed that all gases contained in the reactor would be vented once per year. The composition of the gases vented is estimated using the refinery's hydrogen gas stream composition.

B.1.3 New Benzene Control Equipment

Tesoro is uncertain at this type what emissions may occur from the benzene control equipment. At this time, Tesoro has included an air stripping system followed by a thermal oxidizer. Emission calculations are included based on the estimated design of the unit. Tesoro will supplement this application with additional information when it is available.

B.2 Emissions from Modified and Non-Modified Existing Emission Units

The general methodology for determining projected actual emissions for the existing emission units affected by the project is described below. Although Tesoro has calculated increases in actual emissions from existing emission units, this permit application does not request an increase in the current allowable emissions at any of the existing emission units affected by this project.

Table B.2-1summarizes the predicted process rates following the Project. These process rates are provided for information purposes and should not be interpreted as proposed enforceable limitations. The intent of this table is to provide documentation of the underlying assumptions used to project actual emissions following implementation of the Project in accordance with the definition of projected actual emissions at 40 CFR 52.21(b)(41).

Table B.2-1. Estimated Future Actual Process Rates Following Project

Material	**Process Rate**	
Crude (total)	[redacted]	bpd
Crude (Black Wax)	[redacted]	bpd
Ultraformer	[redacted]	bpd
Distillate Desulfurization Unit	[redacted]	bpd
Fluidized Catalytic Cracking Unit	[redacted]	bpd
Alkylation Unit	[redacted]	bpd
Gasoline Hydrotreater	[redacted]	bpd
Sulfur Recovery Unit	[redacted]	T/d
Benzene Saturation Unit	[redacted]	bpd
Reformate Splitter	[redacted]	bpd
Gasoline	[redacted]	bpd
Diesel	[redacted]	bpd
Jet Kerosene	[redacted]	bpd
Propane	[redacted]	bpd
Decant Cycle Oil	[redacted]	bpd

B.2.1 Process Heaters

Multiple existing process heaters are expected to experience an increase in firing rate and emissions as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2 for each affected process heater. The affected process heaters include the following:

- Crude Unit Furnace H-101
- UFU Furnace F-1
- UFU Regeneration Heater F-15

- DDU Charge Heater F-680
- DDU Rerun Reboiler F-681
- GHT Heater F-701

Projected emissions are calculated based on annual firing rate expected following startup of the Project and emission factors representative of expected operation. Emission factors representative of expected operation are those factors used to represent current emissions, with changes to the fuel gas characteristics as appropriate. Fuel gas characteristics are estimated consistent with the description in Section 2.3; heating value and carbon content are calculated using the projected fuel gas composition, and H_2S content is estimated as the sum of the average and one standard deviation of monthly averages during the baseline period.

Emissions that the process heaters were capable of accommodating during the baseline period are calculated using the maximum monthly firing rate during the baseline period, annualized using a 98% utilization rate, and emission factors generally consistent with those used for the projected emissions. The exception is that the CO_2e emission factor for all process heaters is based on the calculated maximum monthly CO_2e emission factor during the baseline period. This emission factor is lower than what is used for the projected emissions due to the changes in fuel gas composition.

B.2.2 FCCU/CO Boiler

The FCCU/CO Boiler will experience an increase in utilization as a result of the Project. Baseline actual emissions are calculated generally consistent with the methodology described in Section 3.1.1.2, with the exception of condensable PM emissions. On December 1, 2010, EPA revised Method 202 for measuring condensable PM emissions. The modifications to Method 202 were designed to reduce the formation of sulfate artifacts (SO_3, SO_4) through contact and retention of SO_2 in the condensable PM impinger train when the combustion products of sulfur-bearing fuels are passed through water. The revised Method 202 is intended to increase the precision of the method and improve consistency in the measurements. Use of the condensable PM emission factors from measurements using the old Method 202 would have resulted in overestimation of baseline actual emissions in comparison with projected actual emissions. Tesoro completed four engineering tests in April and May of 2011 using the revised Method 202 to develop an updated condensable PM emission factor of 0.98 lb/MMscf exhaust gas, and applied this factor throughout the baseline period. These results are summarized in Attachment B-4.

Calculation of sulfuric acid mist emissions are based on measured SO_2 emissions, conversion of SO_2 to SO_3, and conversion of SO_3 to H_2SO_4. Conversion of SO_2 to SO_3 is estimated based on Permit Condition II.B.3.d.1, which states that SO_3 is equal to 5% of the measured SO_2 emissions based on previous stack test results. Conversion of SO_3 to H_2SO_4 is based on a correlation obtained from a September 1964 article from the American Institute of Chemical Engineering (AIChE) Journal, which is dependent on stack temperature and moisture content. At stack conditions, the calculated conversion rate is 94.2%.

Projected emissions are calculated based on (1) coke burn rate, (2) exhaust flow rate, and (3) CO Boiler firing rate expected following startup of the Project and emission factors representative of expected operation. Emission factors representative of expected operation are generally based on emissions during the baseline period:

- NO_x and CO concentrations in the exhaust are estimated based on expected operational parameters.
- SO_2 emissions are based on the average emission factor (lb/1,000-lb coke burn) observed during the baseline period.
- PM_{10} emissions are based on the results of a 7/7/2011 stack test.This is the most recent compliance test and is conservative compared to the engineer tests completed in April and May of 2011.
- PM and $PM_{2.5}$ emissions are based on the 7/7/2011 PM_{10} stack test results and a particle size distribution developed from four engineering tests completed in April and May of 2011. The particle size distribution showed that filterable PM_{10} emissions are 75% of filterable PM emissions, and $PM_{2.5}$ emissions are 44% of filterable PM emissions.
- VOC emissions are based on EPA's AP-42 emission factor for natural gas firing and the projected CO Boiler firing rate.
- H_2SO_4 emissions are based on the projected SO_2 emissions, conversion of 5% of SO_2 to SO_3, and the calculated conversion of 94.2% of the SO_3 to H_2SO_4.
- CO_2e emissions are calculated based on CO_2, CH_4, and N_2O emission factors from the EPA GHG Mandatory Reporting Rule, 40 CFR 98, Subpart Y. Global warming potentials for CO_2, CH_4, and N_2O are from Table A-1 of 40 CFR 98.

Emissions that the FCCU/CO Boiler was capable of accommodating during the baseline period are calculated using the maximum monthly firing rate during the baseline period, annualized using a 98% utilization rate, and emission factors consistent with those used for the projected emissions.

B.2.3 Ultraformer Compressors (K1s)

The Ultraformer Compressors (K1s) will experience an increase in firing rate and emissions as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2.

Projected emissions are calculated based on annual firing rate expected following startup of the Project and emission factors representative of expected operation. The expected future firing rate is based on a typical hourly firing rate and conservatively assuming 8,760 hours of operation. Emission factors representative of expected operation are those factors used to represent current emissions.

Emissions that the Ultraformer Compressors (K1s) were capable of accommodating during the baseline period are calculated using the maximum monthly firing rate during the baseline period, annualized using a 98% utilization rate, and emission factors consistent with those used for the projected emissions.

B.2.4 Cooling Tower UU3

The Cooling Tower UU3 will experience an increase in emissions as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2. Tesoro has measured VOC content in its cooling water since November 2009 using EPA Method 21. Tesoro used the average measured VOC content to estimate VOC emissions prior to November 2009. Average annual conductivity measurements are used to represent total dissolved solids concentration for calculation of PM emissions. A particle size distribution is estimated based on “Calculating Realistic PM10 Emissions from Cooling Towers,” Reisman and Frisbie, Proceedings of 2001 A&WMA ACE.

Projected emissions are calculated based on the projected cooling water circulation rate following changes to the cooling water lines. VOC content will be restricted after the effective date of new requirements for heat exchange systems (October 29, 2012) under 40 CFR 63 Subpart CC. Total dissolved solids content is estimated using the maximum annual average content during the baseline period.

Emissions that the Cooling Tower UU3 was capable of accommodating during the baseline period are calculated using the actual operating rate during the baseline period (8,760 hours per year at the design circulation rate), and emission factors consistent with those used for the projected emissions.

B.2.5 Sulfur Recovery Unit/ Tail Gas Incinerator (SRU/TGI)

The SRU/TGI will experience an increase in utilization as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2. Emissions from the unit are a function of the sulfur feed rate, sour gas flow, and fuel gas firing at the TGI.

A decrease in emissions of SO_2 will occur due to installation of the TGTU. Tesoro is proposing an enforceable emission limitation of 60 tpy SO_2 on a 12-month rolling sum basis to make this reduction enforceable for purposes of the netting analysis. The emission calculation methodology for SO_2 is therefore the baseline actual-to-potential methodology.

Projected emissions of all other pollutants are calculated based on annual firing rate and sour gas flow rate expected following startup of the Project and emission factors representative of expected operation. The expected future firing rate includes additional firing from new burners associated with the TGTU. Emission factors representative of current operation are those factors used to represent expected emissions.

Emissions that the SRU/TGI were capable of accommodating during the baseline period are calculated using the maximum monthly firing rate and sour gas flow rate during the baseline period, annualized using a 98% utilization rate, and emission factors consistent with those used for the projected emissions. This quantity is not calculated for SO_2 emissions because emissions that could have been accommodated during the baseline period cannot be excluded when using the baseline actual-to-potential emission calculation methodology.

B.2.6 FGDU/SWS (SRU) Flare

The FGDU/SWS (SRU) Flare will experience an increase in utilization as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2. Emissions from the unit are a function of the total acid gas and sour gas flow vented to the flare.

Projected emissions of all other pollutants are calculated based on an estimate of flaring events expected following startup of the Project. The sour gas flow rate during flaring events is estimated based on the largest recent flaring event, which occurred in 2002. Tesoro conservatively assumes that two of these events (totaling 22.2 hours/year) could occur in a calendar year following startup of the Project. Installation of the TGTU is not expected to result in additional malfunctions at the SRU since malfunctions at the TGTU would not cause a shutdown at the SRU.

Emissions that the SRU Flare were capable of accommodating during the baseline period are calculated using 2009 actual emissions.

B.2.7 Cogeneration Unit Turbines

The Cogeneration Unit Turbines will experience an increase in firing rate and emissions as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2.

Projected emissions are calculated based on annual firing rate expected following startup of the Project and emission factors representative of expected operation. Emission factors representative of current operation are those factors used to represent expected emissions. The turbines fire natural gas and amine absorber gas, for which the compositions are not expected to changes as a result of the project. Fuel heating value and carbon content are calculated using the average gas composition during the baseline period. Amine absorber gas H_2S content is estimated using the average of available sampling data. Tesoro collected 21 samples during July and August of 2011 of the amine absorber gas to determine the average H_2S content. The amine absorber was operated normally during this time period and experienced no upsets, therefore Tesoro expects this measured H_2S content to be representative of future operations.

Emissions that the Cogeneration Unit Turbines were capable of accommodating during the baseline period are calculated using the maximum monthly firing rate during the baseline period, annualized using a 98% utilization rate, and emission factors consistent with those used for the projected emissions.

B.2.8 Cogeneration Unit HRSGs

The Cogeneration Unit HRSGs will experience an increase in firing rate and emissions as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2.

Projected emissions are calculated based on annual firing rate expected following startup of the Project and emission factors representative of expected operation. Emission factors representative of expected operation are those factors used to represent current emissions, with alterations to the fuel gas characteristics as appropriate. Fuel gas characteristics are estimated consistent with the description in Section 2.3; heating value and carbon content are calculated using the projected fuel gas composition, and H_2S content is estimated as the sum of the average and one standard deviation of monthly averages during the baseline period.

Emissions that the Cogeneration Unit HRSGs were capable of accommodating during the baseline period are calculated using the maximum monthly firing rate during the baseline period, annualized using a 98% utilization rate, and emission factors generally consistent with those used for the projected emissions. The exception is that the CO_2e emission factor is based on the calculated maximum monthly CO_2e emission factor during the baseline period. This emission factor is lower than what is used for the projected emissions due to the changes in fuel gas composition.

B.2.9 Loading Rack

The incremental emissions increases at the loading rack are calculated based on the estimated increase in gasoline, diesel, and propane production as a result of this Project and emission factors used in the annual emission inventory. For gasoline loadout, emissions occur both from leakage losses upstream of the vapor collection and processing system calculated based on EPA's AP-42 emission factors, and a release factor from the vapor collection and processing system. For diesel and propane loadout, emissions are calculated based on EPA's AP-42 emission factors.

B.2.10 Storage Tanks

The emissions from storage tanks are calculated using EPA's TANKS 4.09d software. The throughput rate of [redacted] is conservatively used to represent potential emissions for Tank 188. Additionally, one roof landing is also included in the unit's potential-to-emit since inspections are required once per ten year time period.

Baseline actual emissions from Tank 206 are based on 2008 and 2009. Projected actual emissions include standing losses from storage of Black Wax crude following installation of an internal floating roof. All facility throughput of Black Wax crude is included in the emission calculations for Tank 188; therefore, only emissions from standing losses are included in the projected actual emissions of Tank 206.

Baseline actual emissions from Tank 291 are based on 2008 and 2009. Tesoro proposes a VOC emission limit of 14.24 tons on a 12-month rolling sum basis at Tank 291. This proposed emission limit is equal to the baseline actual emissions, therefore the project emissions increase is zero from Tank 291.

The incremental emissions increases at the other affected tanks (Tanks 212, 242, 243, 307, 321, 324, 328, 330, 331, and 503) are calculated using EPA's TANKS 4.09d software. As described in Section 2.3.7, these selected tanks represent the worst-case emissions from the increase in production. Increases in throughput affect only the working losses as calculated by the TANKS 4.09d software. Working losses are highest for tanks with the smallest diameters for tanks that have the same controls (i.e., floating roofs).

B.2.11 New and Replaced Fugitive Components in VOC Service

New and replaced fugitive components in VOC service will be installed in a number of existing process units, including the FCCU, CO Boiler, VRU, DDU, Crude, SRU, benzene waste handling, storage tanks, and dewaxing system. New fugitive components will become part of the existing emission unit for the respective families of process equipment. The emissions increase is calculated based on the counts of new components within the existing emission units.

The majority of process fugitive components in VOC service at the Salt Lake City Refinery are already subject to NSPS Subpart VV via 40 CFR 63 Subpart CC (MACT Subpart CC), which incorporates Leak Detection and Repair (LDAR) provisions. In addition, Tesoro is subject to a Consent Agreement incorporated into the Title V permit that restricts the leak rate on light liquid and gas/vapor valves to 500 ppm and pumps to 2,000 ppm. This project is not expected to trigger NSPS Subpart VVa at existing facilities.

The USEPA Protocol for Equipment Leak Emission Estimates is used to quantify potential emissions from the new components installed as part of this project. The final number of installed components will likely change from this estimate after additional detailed design/engineering is performed; however, the change in VOC emissions from this activity is not appreciable and will not change the PSD applicability determination.

The Project will not increase the probability of a relief event of an atmospheric relief valve. Therefore, no emissions from atmospheric relief valves are included in the project emission calculations.

Attachment B-1
Baseline Actual Emission Calculations for Crude Unit Furnace H-101

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Crude	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	2.55	0.26	0.00	0.32	0.32	0.32	0.23	3.83E-03	3,872	0.29	0.06	3,896	46.60	86,407	127.84
Feb-08	2.56	0.22	0.00	0.32	0.32	0.32	0.23	3.29E-03	4,234	0.29	0.06	4,258	44.39	86,786	116.49
Mar-08	2.69	0.32	0.00	0.34	0.34	0.34	0.25	4.75E-03	4,064	0.30	0.06	4,089	51.84	91,284	143.00
Apr-08	2.74	0.43	0.00	0.35	0.35	0.35	0.25	6.47E-03	4,064	0.31	0.06	4,089	51.99	93,045	141.32
May-08	2.76	0.42	0.00	0.35	0.35	0.35	0.25	6.36E-03	4,145	0.31	0.06	4,170	50.55	93,443	140.05
Jun-08	3.82	0.76	0.00	0.38	0.38	0.38	0.28	1.14E-02	5,285	0.34	0.07	5,313	49.57	103,256	128.89
Jul-08	3.68	0.82	0.00	0.37	0.37	0.37	0.27	1.23E-02	4,841	0.33	0.07	4,868	54.75	99,473	134.75
Aug-08	3.30	0.47	0.00	0.33	0.33	0.33	0.24	7.06E-03	4,049	0.29	0.06	4,073	52.67	89,170	133.00
Sep-08	3.12	0.36	0.00	0.31	0.31	0.31	0.23	5.45E-03	3,818	0.28	0.06	3,841	52.15	84,317	125.90
Oct-08	3.36	0.30	0.00	0.34	0.34	0.34	0.25	4.52E-03	4,394	0.30	0.06	4,419	50.21	90,889	125.52
Nov-08	3.35	0.22	0.00	0.34	0.34	0.34	0.24	3.37E-03	4,515	0.30	0.06	4,540	43.50	90,521	118.01
Dec-08	3.21	0.20	0.00	0.32	0.32	0.32	0.23	2.93E-03	4,450	0.29	0.06	4,474	40.53	86,841	107.20
Jan-09	3.61	0.29	0.00	0.36	0.36	0.36	0.26	4.36E-03	5,212	0.32	0.06	5,239	44.61	97,630	114.38
Feb-09	3.19	0.17	0.00	0.32	0.32	0.32	0.23	2.57E-03	4,404	0.28	0.06	4,427	37.50	86,203	109.91
Mar-09	2.92	0.30	0.00	0.29	0.29	0.29	0.21	4.46E-03	4,156	0.26	0.05	4,178	46.76	79,033	118.43
Apr-09	3.21	0.36	0.00	0.32	0.32	0.32	0.23	5.44E-03	4,264	0.29	0.06	4,288	47.62	86,648	116.21
May-09	3.35	0.37	0.00	0.34	0.34	0.34	0.24	5.54E-03	4,472	0.30	0.06	4,497	52.06	90,474	120.20
Jun-09	2.98	0.38	0.00	0.30	0.30	0.30	0.22	5.71E-03	3,825	0.27	0.05	3,847	48.66	80,546	109.51
Jul-09	2.95	0.50	0.00	0.30	0.30	0.30	0.21	7.48E-03	4,046	0.28	0.06	4,069	48.35	79,654	113.44
Aug-09	3.19	0.48	0.00	0.32	0.32	0.32	0.23	7.21E-03	4,269	0.28	0.06	4,293	50.36	86,271	112.01
Sep-09	3.14	0.42	0.00	0.32	0.32	0.32	0.23	6.32E-03	4,225	0.28	0.06	4,249	48.84	84,965	109.82
Oct-09	2.85	0.36	0.00	0.29	0.29	0.29	0.21	5.35E-03	3,903	0.25	0.05	3,924	43.34	77,070	100.02
Nov-09	2.79	0.32	0.00	0.28	0.28	0.28	0.20	4.87E-03	3,696	0.25	0.05	3,716	43.45	75,317	100.41
Dec-09	3.25	0.24	0.00	0.33	0.33	0.33	0.24	3.63E-03	4,879	0.29	0.06	4,903	40.96	87,788	100.34
Jan-10	3.65	0.34	0.00	0.37	0.37	0.37	0.27	5.12E-03	4,709	0.30	0.06	4,734	49.79	98,596	115.51
Feb-10	2.99	0.46	0.00	0.30	0.30	0.30	0.22	6.91E-03	3,888	0.27	0.05	3,910	46.74	80,707	108.57
Mar-10	0.79	0.04	0.00	0.15	0.15	0.15	0.11	6.67E-04	2,300	0.13	0.03	2,311	11.25	39,422	40.88
Apr-10	1.70	0.21	0.00	0.32	0.32	0.32	0.23	3.08E-03	4,821	0.28	0.06	4,844	44.11	84,777	84.89
May-10	1.52	0.34	0.00	0.28	0.28	0.28	0.20	5.04E-03	3,712	0.25	0.05	3,733	50.95	75,924	99.33
Jun-10	1.44	0.34	0.00	0.27	0.27	0.27	0.19	5.17E-03	3,519	0.24	0.05	3,538	49.49	71,790	93.32
Jul-10	1.61	0.50	0.00	0.30	0.30	0.30	0.22	7.50E-03	3,815	0.27	0.05	3,837	52.46	80,416	109.40
Aug-10	1.65	0.47	0.00	0.31	0.31	0.31	0.22	7.09E-03	4,012	0.27	0.05	4,034	53.60	82,365	108.58
Sep-10	1.59	0.31	0.00	0.30	0.30	0.30	0.21	4.66E-03	3,884	0.26	0.05	3,906	54.00	79,638	104.62
Oct-10	1.76	0.32	0.00	0.33	0.33	0.33	0.24	4.74E-03	4,586	0.29	0.06	4,610	54.64	87,965	105.43
Nov-10	1.53	0.19	0.28	0.30	0.30	0.30	0.22	2.90E-03	4,529	0.27	0.05	4,551	48.77	80,763	88.29
Dec-10	1.47	0.26	0.27	0.29	0.29	0.29	0.21	3.87E-03	3,772	0.26	0.05	3,793	48.80	77,596	102.14
Jan-11	1.53	0.34	0.28	0.30	0.30	0.30	0.22	5.11E-03	4,214	0.27	0.05	4,236	47.58	80,362	95.57
Feb-11	1.27	0.27	0.23	0.25	0.25	0.25	0.18	4.08E-03	3,307	0.22	0.04	3,325	48.94	66,684	86.81
Mar-11	1.75	0.39	0.32	0.34	0.34	0.34	0.25	5.78E-03	4,701	0.30	0.06	4,727	54.08	91,996	115.46
Apr-11	1.72	0.38	0.32	0.34	0.34	0.34	0.24	5.67E-03	4,605	0.30	0.06	4,630	54.88	90,753	114.12
May-11	1.65	0.35	0.30	0.32	0.32	0.32	0.23	5.22E-03	4,249	0.29	0.06	4,273	54.73	86,687	114.01
Jun-11	1.57	0.30	0.29	0.31	0.31	0.31	0.22	4.49E-03	4,220	0.27	0.05	4,242	52.34	82,635	101.61

Attachment B-1
Baseline Actual Emission Calculations for Crude Unit Furnace H-101

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Crude	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	30.43	4.53	0.00	3.79	3.79	3.79	2.84	0.06	48,733	3.18	0.64	48,997	--	--	--
Monthly Maximum Throughput During Baseline:	98,596	143.00	103,256	103,256	103,256	103,256	103,256	115.51	115.51	115.51	115.51	115.51	54.88	103,256	143.00
Occurs:	Jan-10	Mar-08	Jun-08	Jun-08	Jun-08	Jun-08	Jun-08	Jan-10	Jan-10	Jan-10	Jan-10	Jan-10	Apr-11	Jun-08	Mar-08

Emission Factor References

[1] Jan-08 through May-08: 5/4/05 stack test results of 0.059 lb/MMBtu.
Jun-08 through Feb-10: 5/30/08 stack test results of 0.074 lb/MMBtu.
Mar-10 through Oct-10: 5/7/10 stack test results of 0.040 lb/MMBtu after Low NOx burner installation in Mar-10.
Nov-10 through Jun-11: 10/20/10 stack test results of 0.038 lb/MMBtu.

[2] Calculated as follows: SO2 (tons) = Monthly average fuel gas H2S contents (ppmv) * 10^6 / 385.34 ft3/lb-mol * 64 lb/lb-mol * MMscf / 2000 lb/ton.

[3] Jan-08 through Oct-10: 5/7/10 stack test results of 0 lb/MMBtu
Nov-10 through Jun-11: 10/20/10 stack test results of 0.007 lb/MMBtu

[4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.

[8] Assumed to be 1.5% of total SO2 emissions consistent with TRI reporting.

[9] Calculated as follows: CO2 (tons) = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg * 10^6 scf/MMscf * MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.
CH4 (tons) = 0.003 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
N2O (tons) = 0.0006 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
CO2e (tons) = CO2 (tons) + 21 * CH4 (tons) + 310 * N2O (tons) per Table A-1 of 40 CFR 98.

[10] Measured throughput rates.

Attachment B-2
Projected Actual Emission Calculations for Crude Unit Furnace H-101

Quantity	Value	Units	Reference
Projected Firing Rate:	113.70	Mscf/hr	Calculated
	124.90	MMBtu/hr	Engineering estimate
Fuel HHV:	1098.55	Btu/scf	Engineering estimate
Fuel H_2S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	0.039	lb/MMBtu	4.87	21.34	2010 Stack Test Results
SO_2	8.31	lb/MMscf	0.94	4.14	Calculated
CO	0.0033	lb/MMBtu	0.41	1.81	2010 Stack Test Results
PM	7.45E-03	lb/MMBtu	0.93	4.08	AP-42 Table 1.4-2
PM_{10}	7.45E-03	lb/MMBtu	0.93	4.08	AP-42 Table 1.4-2
$PM_{2.5}$	7.45E-03	lb/MMBtu	0.93	4.08	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	0.67	2.95	AP-42 Table 1.4-2
H_2SO_4	0.12	lb/MMscf	1.42E-02	6.20E-02	TRI calculation (1.5% of SO2 emissions)
CO_2 [3]	143,822.95	lb/MMscf	16,352.00	71,621.75	2008-2011 monitoring
CH_4 [4]	7.27	lb/MMscf	0.83	3.62	40 CFR 98 Subpart C
N_2O [5]	1.45	lb/MMscf	0.17	0.72	40 CFR 98 Subpart C
CO_2e [6]	144,426.00	lb/MMscf	16,420.56	71,922.06	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf
[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
[3] Emission Factor calculated from 2008-2011 monitoring data per Equation C-5 of 40 CFR 98
[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-2
Projected Actual Emission Calculations for Crude Unit Furnace H-101

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	30.43	4.53	0.00	3.79	3.79	3.79	2.84	0.06	48,997	Attachment B-1
B. Capable of Accommodating	22.18	6.85	2.03	4.59	4.59	4.59	3.32	0.08	76,060	See below.
C. Projected Emissions	21.34	4.14	1.81	4.08	4.08	4.08	2.95	0.06	71,922	
D. Demand Growth (D=B-A)	0.00	2.32	2.03	0.80	0.80	0.80	0.48	0.02	27,063	
E. Projected Actual Emissions (E=C-D)	21.34	1.81	0.00	3.28	3.28	3.28	2.47	0.04	44,859	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	98,596	143.00	103,256	103,256	103,256	103,256	103,256	115.51	115.51	
Month that this occurred:	Jan-10	Mar-08	Jun-08	Jun-08	Jun-08	Jun-08	Jun-08	Jan-10	Jan-10	
Throughput that Unit was Capable of Accommodating (Units/year)	1,137,666	1,650.08	1,231,159	1,231,159	1,231,159	1,231,159	1,231,159	1,332.89	1,332.89	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.039	8.31	0.0033	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	22.18	6.85	2.03	4.59	4.59	4.59	3.32	0.08	76,060	

Attachment B-3
Baseline Actual Emission Calculations for FCCU/CO Boiler

Date	NO_X tons [1]	SO_2 tons [2]	CO tons [3]	PM tons [4]	PM_{10} tons [5]	$PM_{2.5}$ tons [6]	VOC tons [7]	H_2SO_4 tons [8]	CO_2 tons [9]	CH_4 tons [9]	N_2O tons [9]	GHG tons CO_2e [9]	Coke Burn Rate tons coke [10]	Exhaust Flow MMscf [10]	Fuel Gas Firing MSCF [10]
Jan-08	9.44	49.73	6.48	7.31	5.96	4.28	0.10	2.87	20,355	2.19	0.32	20,500	5,864.17	3,878.36	35,206.66
Feb-08	10.80	43.53	5.84	6.59	5.38	3.86	0.09	2.51	17,974	1.93	0.28	18,102	5,178.27	3,496.06	31,288.37
Mar-08	13.07	51.75	6.51	7.35	5.99	4.30	0.09	2.99	20,889	2.24	0.33	21,038	6,018.05	3,897.76	33,162.73
Apr-08	10.70	43.38	6.05	6.83	5.57	4.00	0.10	2.50	18,789	2.02	0.29	18,922	5,412.91	3,622.19	36,686.06
May-08	8.09	52.71	6.25	7.06	5.75	4.13	0.06	3.04	20,439	2.20	0.32	20,584	5,888	3,742	22,072
Jun-08	7.58	54.21	6.16	6.95	5.67	4.07	0.05	3.13	20,666	2.22	0.32	20,812	5,954	3,686	19,628
Jul-08	9.87	39.71	6.51	7.29	5.95	4.27	0.08	2.29	21,404	2.30	0.33	21,556	6,166	3,899	29,386
Aug-08	12.57	49.11	6.56	5.44	4.56	3.47	0.10	2.83	21,181	2.28	0.33	21,332	6,102	3,926	34,705
Sep-08	11.93	53.56	6.23	5.17	4.34	3.30	0.08	3.09	20,992	2.25	0.33	21,141	6,047	3,730	29,742
Oct-08	12.80	53.76	6.39	5.30	4.45	3.38	0.08	3.10	20,439	2.20	0.32	20,584	5,888	3,826	30,295
Nov-08	11.48	50.40	5.87	4.87	4.09	3.11	0.11	2.91	18,411	1.98	0.29	18,542	5,304	3,517	38,613
Dec-08	11.04	46.87	5.88	4.88	4.09	3.11	0.12	2.70	17,753	1.91	0.28	17,879	5,115	3,522	42,487
Jan-09	12.71	47.96	6.01	4.98	4.18	3.18	0.10	2.77	18,240	1.96	0.28	18,369	5,255	3,596	37,449
Feb-09	14.54	39.47	5.71	4.74	3.97	3.02	0.11	2.28	16,360	1.76	0.26	16,476	4,713	3,417	40,492
Mar-09	13.93	50.04	6.73	5.59	4.69	3.56	0.12	2.89	19,364	2.08	0.30	19,502	5,579	4,032	45,127
Apr-09	14.10	50.37	6.48	5.38	4.51	3.43	0.13	2.91	19,994	2.15	0.31	20,136	5,760	3,881	45,745
May-09	17.49	53.38	6.51	5.41	4.54	3.45	0.13	3.08	20,751	2.23	0.32	20,898	5,978	3,901	47,480
Jun-09	11.19	56.81	6.22	5.16	4.33	3.29	0.10	3.28	20,682	2.22	0.32	20,829	5,958	3,725	34,973
Jul-09	16.30	49.61	6.30	5.23	4.38	3.33	0.10	2.86	20,390	2.19	0.32	20,535	5,874	3,771	37,213
Aug-09	15.41	50.14	6.35	5.27	4.42	3.36	0.10	2.89	20,655	2.22	0.32	20,801	5,950	3,803	34,625
Sep-09	12.15	51.64	5.83	4.84	4.06	3.08	0.10	2.98	20,253	2.18	0.32	20,397	5,835	3,492	35,423
Oct-09	10.07	44.89	6.07	4.64	3.93	3.04	0.11	2.59	20,250	2.18	0.32	20,394	5,834	3,636	40,595
Nov-09	10.72	45.44	5.89	4.45	3.77	2.92	0.10	2.62	19,659	2.11	0.31	19,798	5,664	3,528	37,206
Dec-09	8.37	43.84	5.92	4.47	3.79	2.94	0.11	2.53	18,092	1.94	0.28	18,221	5,212	3,547	39,316
Jan-10	9.71	42.36	5.83	4.40	3.73	2.89	0.13	2.44	17,966	1.93	0.28	18,093	5,176	3,490	47,374
Feb-10	9.69	34.61	5.43	4.10	3.47	2.69	0.17	2.00	16,511	1.77	0.26	16,628	4,757	3,252	62,980
Mar-10	5.71	23.71	4.19	3.16	2.68	2.08	0.11	1.37	14,693	1.58	0.23	14,798	4,233	2,509	40,775
Apr-10	10.55	37.99	5.70	4.30	3.65	2.83	0.12	2.19	16,993	1.83	0.27	17,114	4,896	3,415	42,443
May-10	11.86	58.08	9.07	4.47	3.79	2.94	0.13	3.35	21,447	2.30	0.34	21,599	6,179	3,549	49,076
Jun-10	11.94	58.90	9.01	4.47	3.79	2.94	0.13	3.40	21,264	2.28	0.33	21,415	6,126	3,550	46,952
Jul-10	15.27	61.46	5.89	4.53	3.84	2.98	0.10	3.55	22,176	2.38	0.35	22,334	6,389	3,594	38,029
Aug-10	14.70	63.30	7.98	4.66	3.95	3.06	0.12	3.65	22,374	2.40	0.35	22,533	6,446	3,700	42,406
Sep-10	13.33	56.17	5.08	4.18	3.54	2.74	0.10	3.24	20,938	2.25	0.33	21,087	6,032	3,268	35,972
Oct-10	13.21	61.55	6.02	6.59	5.38	3.87	0.10	3.55	22,123	2.38	0.35	22,280	6,373	3,547	37,809
Nov-10	14.13	55.84	4.77	6.68	5.45	3.92	0.12	3.22	20,869	2.24	0.33	21,018	6,012	3,597	45,257
Dec-10	9.84	38.58	4.38	6.32	5.16	3.71	0.13	2.23	18,361	1.97	0.29	18,491	5,290	3,405	45,770
Jan-11	10.32	39.68	6.22	6.45	5.26	3.78	0.14	2.29	18,401	1.98	0.29	18,532	5,301	3,471	51,088
Feb-11	11.53	32.51	7.36	5.78	4.72	3.39	0.11	1.88	17,890	1.92	0.28	18,017	5,154	3,110	39,833
Mar-11	13.80	48.62	7.35	6.78	5.54	3.98	0.11	2.81	21,808	2.34	0.34	21,962	6,283	3,653	40,144
Apr-11	14.21	47.32	4.21	6.29	5.13	3.69	0.10	2.73	21,687	2.33	0.34	21,841	6,248	3,386	35,552
May-11	16.31	55.03	3.21	5.16	4.34	3.31	0.10	3.18	22,893	2.46	0.36	23,055	6,595	3,789	35,787
Jun-11	13.93	48.23	1.49	4.69	3.94	3.00	0.11	2.78	21,054	2.26	0.33	21,203	6,065	3,440	39,519

Attachment B-3
Baseline Actual Emission Calculations for FCCU/CO Boiler

Date	NO_X tons [1]	SO_2 tons [2]	CO tons [3]	PM tons [4]	PM_{10} tons [5]	$PM_{2.5}$ tons [6]	VOC tons [7]	H_2SO_4 tons [8]	CO_2 tons [9]	CH_4 tons [9]	N_2O tons [9]	GHG tons CO_2e [9]	Coke Burn Rate tons coke [10]	Exhaust Flow MMscf [10]	Fuel Gas Firing MSCF [10]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	149.07	582.47	73.92	60.24	50.52	38.36	1.18	33.42	239,188	25.69	3.74	240,886	--	--	--
Monthly Maximum Throughput During Baseline:	N/A	6,166	4,032	4,032	4,032	4,032	47,480	6,595	6,595	6,595	6,595	6,595	6,595	4,032	62,980
Occurs:	N/A	Jul-08	Mar-09	Mar-09	Mar-09	Mar-09	May-09	May-11	May-11	May-11	May-11	May-11	May-11	Mar-09	Feb-10

References

[1] Based on CEMS data.
[2] Based on CEMS data.
[3] Based on CEMS data. Direct measurements began 5/6/10; calculated emission factor applied retroactively.
[4] Filterable emission factor derived from particle size distributions from 2011 engineering testing data (1.332 lb PM/lb PM10).
Condensable emission factor derived from 4/6/11, 4/11/11, 5/5/11, and 5/10/11 engineering test data (0.98 lb/MMscf).
[5] Filterable emission factors from 5/14/07, 5/28/08, 8/5/09, 8/5/10 stack testing data, and 2011 engineering testing data.
Condensable emission factor derived from 4/6/11, 4/11/11, 5/5/11, and 5/10/11 engineering test data (0.98 lb/MMscf).
[6] Filterable emission factor derived from particle size distributions from 2011 engineering testing data (0.585 lb PM2.5/lb PM10).
Condensable emission factor derived from 4/6/11, 4/11/11, 5/5/11, and 5/10/11 engineering test data (0.98 lb/MMscf).
[7] Emission factor of 5.5 lb/MMscf per AP-42 Table 1.4-2 multiplied by the fuel gas firing rate.
[8] Refer to Attachment B-4 for derivation of this emission factor.
[9] Emission factor of 3,471.13 lb/1,000-lb per 40 CFR 98 Subpart Y (refer to projected emission calculations).
CO2e (tons) = CO2 (tons) + 21 * CH4 (tons) + 310 * N2O (tons) per Table A-1 of 40 CFR 98.
[10] Measured throughput rates.

Attachment B-4
Projected Actual Emission Calculations for FCCU/CO Boiler

Quantity	Value	Units	Reference
Coke Burn:	19,889	lb/hr	Engineering estimate
	19.889	1,000-lb/hr	
Carbon Content:	0.94	lb C / lb coke	40 CFR 98, Equation Y-8
Exhaust Flow Rate:	93249	scfm	Engineering estimate
CO Boiler Firing:	30.0	MMBtu/hr	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	--	--	39.73	174.00	Emission limit
SO_2	8.75	lb/1,000-lb	174.0	762.25	2008-2011 CEMS Data
CO	5.58	lb/MMscf exhaust	31.22	136.74	2008-2011 CEMS Data
PM	4.59	lb/MMscf exhaust	25.67	112.42	7/7/11 Stack Testing
PM_{10}	3.94	lb/MMscf exhaust	22.04	96.55	7/7/11 Stack Testing
$PM_{2.5}$	3.13	lb/MMscf exhaust	17.52	76.72	7/7/11 Stack Testing
VOC	0.005	lb/MMBtu	0.16	0.71	AP-42 Table 1.4-2
H_2SO_4 [3]	0.50	lb/1,000-lb	10.04	43.99	See following pages.
CO_2 [4]	3446.67	lb/1,000-lb	68,551	300,252	40 CFR 98 Subpart Y
CH_4 [5]	0.37	lb/1,000-lb	7.36	32.25	40 CFR 98 Subpart Y
N_2O [6]	0.05	lb/1,000-lb	1.07	4.69	40 CFR 98 Subpart Y
CO_2e [7]	3471.13	lb/1,000-lb	69,037	302,384	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/1,000-lb) x Coke Burn (lb/yr) / Hours of Operation (hr/yr)
[2] Projected Emissions (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
[3] See following pages of Attachment B-4 for derivation of this emission factor.
[4] Emission factor based on carbon content and 44 lb CO2/12 lb C per Equation Y-8 of 40 CFR 98
[5] Emission factor = CO2 factor * 0.011 / 102.41 lb/1,000-lb per Equation Y-9 of 40 CFR 98
[6] Emission factor = CO2 factor * 0.0016 / 102.41 lb/1,000-lb per Equation Y-10 of 40 CFR 98
[7] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-4
Projected Actual Emission Calculations for FCCU/CO Boiler

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	149.07	582.47	73.92	60.24	50.52	38.36	1.18	33.42	240,886	Attachment B-3
B. Capable of Accommodating	N/A	603.40	129.81	106.72	91.66	72.83	1.51	37.24	264,154	See below.
C. Projected Emissions	174.00	762.25	136.74	112.42	96.55	76.72	0.71	43.99	302,384	
D. Demand Growth (D=B-A)	0.00	20.93	55.88	46.48	41.14	34.47	0.33	3.83	23,268	
E. Projected Actual Emissions (E=C-D)	174.00	741.31	80.85	65.94	55.41	42.25	0.38	40.16	279,116	
F. Emission Increase (F=E-A)	24.93	158.85	6.93	5.70	4.90	3.89	0.00	6.74	38,230	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits	174.00	671.43	N/A	N/A	N/A	N/A	N/A	41.13	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	N/A	6,166	4,032	4,032	4,032	4,032	47,480	6,595	6,595	
Month that this occurred:	N/A	Jul-08	Mar-09	Mar-09	Mar-09	Mar-09	May-09	May-11	May-11	
Throughput that Unit was Capable of Accommodating (Units/year)	N/A	71,150	46,527	46,527	46,527	46,527	547,854	76,100	76,100	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	N/A	17.0	5.58	4.59	3.94	3.13	0.006	0.98	6,942	lb/ton = 2 * lb/1,000-lb
Units	N/A	tons coke	MMscf	MMscf	MMscf	MMscf	MSCF	tons coke	tons coke	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	N/A	603.40	129.81	106.72	91.66	72.83	1.51	37.24	264,154	

Annualized rate assumes a 98% capacity factor to account for unit downtime.
SO2 emission rate calculated from 705 tpy SOx emission limit divided by 1.05 consistent with Permit Condition II.B.3.d.1.
PM10 annual emission limit of 69 tpy includes only filterable PM10. Project emission increases include filterable and condensable PM10.
NOx potential emissions based on the annual emission limit at the unit rather than projected actual emissions.

Attachment B-4
Projected Actual Emission Calculations for FCCU/CO Boiler

Derivation of H2SO4 Emission Factor

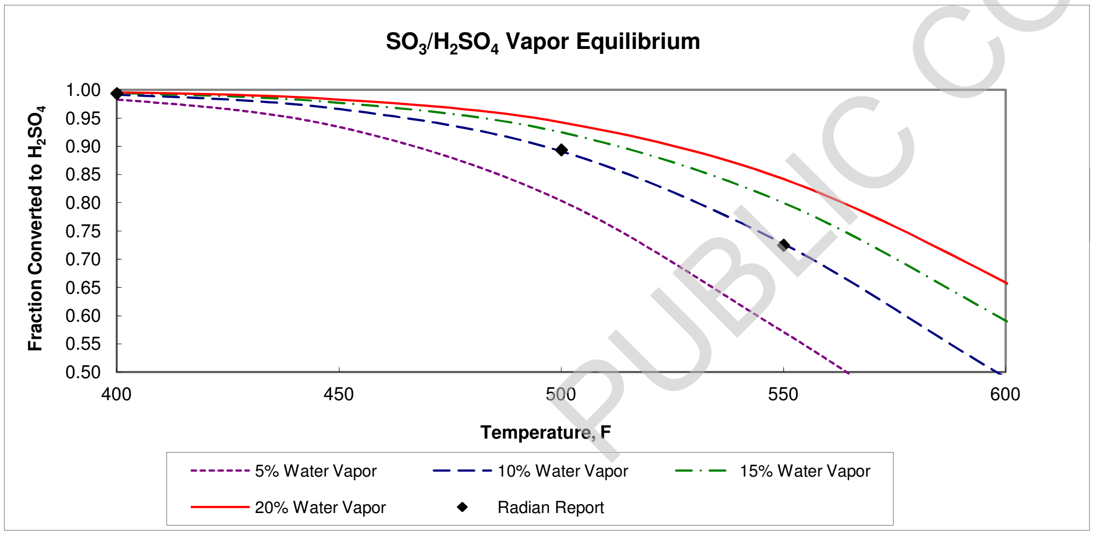
Permit Condition II.B.3.d.1 states the following:

Each day, the daily SOx emissions from the FCCU regenerator, as calculated elsewhere in this permit, shall be multiplied by a factor of 1.05 and divided by the amount of coke burned in the FCCU regenerator during the same period. The result shall be added to the calculated values for the previous six days and the total divided by seven to determine the seven-day average.

Total SOx = 1.05 * SO2 --> SO3 is equal to 5% of measured SO2 emissions.

Fraction of SO3 converted to H2SO4 based on September 1964 article from the American Institute of Chemical Engineering (AIChE) Journal. Refer to figure below. At typical stack conditions (465 F, 8.6% moisture), 94.2% of SO3 is converted to H2SO4. Resulting value is corrected to H2SO4 by molecular weight (98.03 / 80.01).

H2SO4 (lb/1,000 lb) = SO2 (lb/1,000 lb) x 0.05 x 0.942 x 98.03 / 80.01 = 0.0577 * SO2 (lb/1,000 lb) = 0.49 lb/1,000 lb



Attachment B-4
Projected Actual Emission Calculations for FCCU/CO Boiler

Summary of 2011 Engineering Test Results

	4/6 Case 1	4/11 Case 2	5/5 Case 1	5/10 Case 2	Average
PM (lb/MMscf)	3.67	2.09	3.09	2.63	2.87
PM10 (lb/MMscf)	2.02	1.88	2.92	2.34	2.29
PM2.5 (lb/MMscf)	1.28	1.51	2.42	1.69	1.72
Condensables	0.74	0.94	1.50	0.76	0.98

Emissions of PM, PM10, and PM2.5 include condensables as presented above.

Particle Size Distribution (Filterable)

	4/6 Case 1	4/11 Case 2	5/5 Case 1	5/10 Case 2	Average
PM	1.00	1.00	1.00	1.00	1.00
PM10	0.44	0.82	0.90	0.85	0.75
PM2.5	0.19	0.49	0.58	0.50	0.44

Attachment B-5
Baseline Actual Emission Calculations for Ultraformer Unit Furnace F-1

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	UFU	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	4.42	0.20	2.76	0.25	0.25	0.25	0.18	2.97E-03	3,005	0.22	0.04	3,023	9.99	67,048	99.19
Feb-08	3.92	0.17	2.70	0.24	0.24	0.24	0.18	2.48E-03	3,199	0.22	0.04	3,217	9.31	65,564	88.01
Mar-08	4.69	0.23	2.77	0.25	0.25	0.25	0.18	3.50E-03	2,992	0.22	0.04	3,011	10.32	67,207	105.29
Apr-08	4.71	0.32	2.87	0.26	0.26	0.26	0.19	4.84E-03	3,040	0.23	0.05	3,059	10.23	69,596	105.70
May-08	4.77	0.32	2.95	0.27	0.27	0.27	0.19	4.87E-03	3,174	0.24	0.05	3,194	10.29	71,560	107.25
Jun-08	4.25	0.56	3.15	0.28	0.28	0.28	0.21	8.42E-03	3,913	0.25	0.05	3,934	9.65	76,467	95.45
Jul-08	4.45	0.61	3.04	0.27	0.27	0.27	0.20	9.14E-03	3,591	0.24	0.05	3,611	9.92	73,790	99.96
Aug-08	4.39	0.35	2.73	0.25	0.25	0.25	0.18	5.24E-03	3,004	0.22	0.04	3,022	9.55	66,154	98.67
Sep-08	4.13	0.27	2.56	0.23	0.23	0.23	0.17	4.02E-03	2,813	0.21	0.04	2,830	9.17	62,123	92.76
Oct-08	3.81	0.21	2.55	0.23	0.23	0.23	0.17	3.08E-03	2,995	0.20	0.04	3,012	8.24	61,939	85.54
Nov-08	4.27	0.16	2.65	0.24	0.24	0.24	0.17	2.39E-03	3,204	0.21	0.04	3,221	7.81	64,230	83.73
Dec-08	4.25	0.14	2.63	0.24	0.24	0.24	0.17	2.16E-03	3,275	0.21	0.04	3,292	7.59	63,912	78.90
Jan-09	4.87	0.22	3.02	0.27	0.27	0.27	0.20	3.28E-03	3,912	0.24	0.05	3,932	7.90	73,267	85.84
Feb-09	4.38	0.13	2.71	0.25	0.25	0.25	0.18	1.96E-03	3,364	0.22	0.04	3,382	8.42	65,848	83.95
Mar-09	4.50	0.25	2.79	0.25	0.25	0.25	0.18	3.82E-03	3,563	0.22	0.04	3,581	10.06	67,742	101.51
Apr-09	4.47	0.28	2.77	0.25	0.25	0.25	0.18	4.22E-03	3,310	0.22	0.04	3,328	9.59	67,260	90.20
May-09	5.29	0.33	3.28	0.30	0.30	0.30	0.21	4.88E-03	3,932	0.26	0.05	3,954	10.16	79,555	105.69
Jun-09	4.96	0.35	3.07	0.28	0.28	0.28	0.20	5.28E-03	3,542	0.25	0.05	3,562	10.31	74,579	101.40
Jul-09	5.02	0.45	3.11	0.28	0.28	0.28	0.20	6.73E-03	3,642	0.25	0.05	3,662	10.44	75,487	102.10
Aug-09	4.57	0.38	2.83	0.26	0.26	0.26	0.19	5.75E-03	3,403	0.23	0.05	3,422	9.52	68,763	89.28
Sep-09	4.63	0.35	2.87	0.26	0.26	0.26	0.19	5.18E-03	3,466	0.23	0.05	3,485	9.95	69,687	90.07
Oct-09	4.48	0.31	2.78	0.25	0.25	0.25	0.18	4.68E-03	3,414	0.22	0.04	3,432	9.09	67,400	87.47
Nov-09	3.61	0.27	2.61	0.24	0.24	0.24	0.17	4.10E-03	3,107	0.21	0.04	3,125	9.48	63,324	84.42
Dec-09	3.22	0.15	2.33	0.21	0.21	0.21	0.15	2.32E-03	3,118	0.19	0.04	3,133	5.65	56,538	64.12
Jan-10	4.49	0.27	3.24	0.29	0.29	0.29	0.21	4.09E-03	3,761	0.24	0.05	3,781	9.70	78,759	92.27
Feb-10	3.63	0.36	2.62	0.24	0.24	0.24	0.17	5.44E-03	3,064	0.21	0.04	3,081	9.98	63,601	85.56
Mar-10	1.09	0.02	0.79	0.07	0.07	0.07	0.05	3.25E-04	1,120	0.06	0.01	1,125	1.25	19,186	19.90
Apr-10	4.03	0.17	2.91	0.26	0.26	0.26	0.19	2.57E-03	4,019	0.23	0.05	4,038	7.05	70,673	70.77
May-10	4.56	0.35	3.29	0.30	0.30	0.30	0.22	5.31E-03	3,910	0.26	0.05	3,932	10.74	79,965	104.62
Jun-10	4.22	0.36	3.05	0.28	0.28	0.28	0.20	5.34E-03	3,631	0.24	0.05	3,652	10.39	74,092	96.31
Jul-10	4.51	0.49	3.26	0.29	0.29	0.29	0.21	7.38E-03	3,754	0.26	0.05	3,775	10.75	79,122	107.65
Aug-10	4.60	0.46	3.32	0.30	0.30	0.30	0.22	6.94E-03	3,927	0.27	0.05	3,949	10.87	80,633	106.30
Sep-10	4.30	0.29	3.10	0.28	0.28	0.28	0.20	4.41E-03	3,676	0.25	0.05	3,697	10.57	75,363	99.00
Oct-10	4.56	0.29	3.30	0.30	0.30	0.30	0.22	4.31E-03	4,170	0.26	0.05	4,192	10.09	79,985	95.87
Nov-10	3.20	0.16	2.71	0.25	0.25	0.25	0.18	2.36E-03	3,695	0.22	0.04	3,713	7.84	65,892	72.03
Dec-10	3.53	0.24	3.00	0.27	0.27	0.27	0.20	3.63E-03	3,537	0.24	0.05	3,557	10.24	72,776	95.80
Jan-11	3.42	0.30	2.90	0.26	0.26	0.26	0.19	4.48E-03	3,694	0.23	0.05	3,713	9.00	70,446	83.78
Feb-11	2.96	0.25	2.51	0.23	0.23	0.23	0.16	3.73E-03	3,023	0.20	0.04	3,040	9.46	60,963	79.36
Mar-11	3.65	0.32	3.10	0.28	0.28	0.28	0.20	4.74E-03	3,850	0.25	0.05	3,871	10.11	75,339	94.55
Apr-11	3.61	0.31	3.07	0.28	0.28	0.28	0.20	4.65E-03	3,782	0.25	0.05	3,802	9.98	74,535	93.72
May-11	3.49	0.29	2.97	0.27	0.27	0.27	0.19	4.34E-03	3,529	0.24	0.05	3,549	9.85	71,991	94.68
Jun-11	3.42	0.26	2.91	0.26	0.26	0.26	0.19	3.84E-03	3,606	0.23	0.05	3,625	9.25	70,612	86.83

Attachment B-5
Baseline Actual Emission Calculations for Ultraformer Unit Furnace F-1

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	UFU	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	50.72	3.55	33.17	3.00	3.00	3.00	2.21	0.05	41,916	2.75	0.55	42,144	--	--	--
Monthly Maximum Throughput During Baseline:	80,633	107.25	79,965	79,965	79,965	79,965	79,555	107.65	107.65	107.65	107.65	107.65	10.87	80,633	107.65
Occurs:	Aug-10	May-08	May-10	May-10	May-10	May-10	May-09	Jul-10	Jul-10	Jul-10	Jul-10	Jul-10	Aug-10	Aug-10	Jul-10

Emission Factor References

[1] Jan-08 through Oct-08: 11/18/04 stack test results of 89.04 lb/MMscf.
Nov-08 through Oct-09: 10/21/08 stack test results of 0.133 lb/MMBtu.
Nov-09 through Oct-10: 10/21/09 stack test results of 0.114 lb/MMBtu.
Nov-10 through Jun-11: 10/28/10 stack test results of 0.097 lb/MMBtu.

[2] Calculated as follows: SO2 (tons) = Monthly average fuel gas H2S contents (ppmv) * 10^6 / 385.34 ft3/lb-mol * 64 lb/lb-mol * MMscf / 2000 lb/ton.

[3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.

[4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.

[8] Assumed to be 1.5% of total SO2 emissions consistent with TRI reporting.

[9] Calculated as follows: CO2 (tons) = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg * 10^6 scf/MMscf * MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.
CH4 (tons) = 0.003 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
N2O (tons) = 0.0006 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
CO2e (tons) = CO2 (tons) + 21 * CH4 (tons) + 310 * N2O (tons) per Table A-1 of 40 CFR 98.

[10] Measured throughput rates.

Attachment B-6
Projected Actual Emission Calculations for Ultraformer Unit Furnace F-1

Quantity	Value	Units	Reference
Projected Firing Rate:	95.76	Mscf/hr	Calculated
	105.20	MMBtu/hr	Engineering estimate
Fuel HHV:	1098.55	Btu/scf	Engineering estimate
Fuel H_2S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	0.115	lb/MMBtu	12.10	52.99	2008-2010 Stack Test Results
SO_2	8.31	lb/MMscf	0.80	3.48	Calculated
CO	0.0824	lb/MMBtu	8.66	37.95	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	0.78	3.43	AP-42 Table 1.4-2
PM_{10}	7.45E-03	lb/MMBtu	0.78	3.43	AP-42 Table 1.4-2
$PM_{2.5}$	7.45E-03	lb/MMBtu	0.78	3.43	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	0.57	2.48	AP-42 Table 1.4-2
H_2SO_4	0.12	lb/MMscf	1.19E-02	5.23E-02	TRI calculation (1.5% of SO2 emissions)
CO_2 [3]	143,822.95	lb/MMscf	13,772.86	60,325.12	2008-2011 Monitoring
CH_4 [4]	7.27	lb/MMscf	0.70	3.05	40 CFR 98 Subpart C
N_2O [5]	1.45	lb/MMscf	0.14	0.61	40 CFR 98 Subpart C
CO_2e [6]	144,426.00	lb/MMscf	13,830.61	60,578.07	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf
[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
[3] Emission Factor calculated from 2008-2011 monitoring data per Equation C-5 of 40 CFR 98
[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-6
Projected Actual Emission Calculations for Ultraformer Unit Furnace F-1

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	50.72	3.55	33.17	3.00	3.00	3.00	2.21	0.05	42,144	Attachment B-5
B. Capable of Accommodating	53.50	5.14	37.99	3.44	3.44	3.44	2.47	0.08	70,878	See below.
C. Projected Emissions	52.99	3.48	37.95	3.43	3.43	3.43	2.48	0.05	60,578	
D. Demand Growth (D=B-A)	2.78	1.59	4.82	0.44	0.44	0.44	0.27	0.02	28,734	
E. Projected Actual Emissions (E=C-D)	50.21	1.89	33.12	3.00	3.00	3.00	2.22	0.03	31,844	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	80,633	107.25	79,965	79,965	79,965	79,965	79,555	107.65	107.65	
Month that this occurred:	Aug-10	May-08	May-10	May-10	May-10	May-10	May-09	Jul-10	Jul-10	
Throughput that Unit was Capable of Accommodating (Units/year)	930,398	1,237.52	922,692	922,692	922,692	922,692	917,964	1,242.09	1,242.09	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.115	8.31	0.08	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	53.50	5.14	37.99	3.44	3.44	3.44	2.47	0.08	70,878	

Attachment B-7
Baseline Actual Emission Calculations for UFU Regeneration Heater

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	UFU	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	0.19	0.01	0.16	0.01	0.01	0.01	0.01	1.73E-04	175	0.01	0.00	176	9.99	3,895	5.76
Feb-08	0.20	0.01	0.17	0.02	0.02	0.02	0.01	1.55E-04	200	0.01	0.00	201	9.31	4,093	5.49
Mar-08	0.19	0.01	0.16	0.01	0.01	0.01	0.01	2.05E-04	176	0.01	0.00	177	10.32	3,949	6.19
Apr-08	0.19	0.02	0.16	0.01	0.01	0.01	0.01	2.65E-04	167	0.01	0.00	168	10.23	3,814	5.79
May-08	0.20	0.02	0.17	0.01	0.01	0.01	0.01	2.73E-04	178	0.01	0.00	179	10.29	4,012	6.01
Jun-08	0.17	0.03	0.14	0.01	0.01	0.01	0.01	3.88E-04	180	0.01	0.00	181	9.65	3,520	4.39
Jul-08	0.23	0.04	0.19	0.02	0.02	0.02	0.01	5.78E-04	227	0.02	0.00	229	9.92	4,669	6.32
Aug-08	0.16	0.02	0.13	0.01	0.01	0.01	0.01	2.58E-04	148	0.01	0.00	149	9.55	3,261	4.86
Sep-08	0.12	0.01	0.10	0.01	0.01	0.01	0.01	1.64E-04	115	0.01	0.00	115	9.17	2,533	3.78
Oct-08	0.15	0.01	0.13	0.01	0.01	0.01	0.01	1.51E-04	147	0.01	0.00	148	8.24	3,037	4.19
Nov-08	0.20	0.01	0.17	0.02	0.02	0.02	0.01	1.51E-04	203	0.01	0.00	204	7.81	4,070	5.31
Dec-08	0.20	0.01	0.17	0.02	0.02	0.02	0.01	1.41E-04	214	0.01	0.00	215	7.59	4,179	5.16
Jan-09	0.22	0.01	0.18	0.02	0.02	0.02	0.01	1.99E-04	238	0.01	0.00	239	7.90	4,456	5.22
Feb-09	0.20	0.01	0.16	0.01	0.01	0.01	0.01	1.19E-04	204	0.01	0.00	205	8.42	3,984	5.08
Mar-09	0.17	0.01	0.15	0.01	0.01	0.01	0.01	1.99E-04	185	0.01	0.00	186	10.06	3,525	5.28
Apr-09	0.17	0.01	0.14	0.01	0.01	0.01	0.01	2.14E-04	168	0.01	0.00	169	9.59	3,416	4.58
May-09	0.20	0.02	0.17	0.02	0.02	0.02	0.01	2.51E-04	203	0.01	0.00	204	10.16	4,100	5.45
Jun-09	0.17	0.02	0.15	0.01	0.01	0.01	0.01	2.53E-04	169	0.01	0.00	170	10.31	3,566	4.85
Jul-09	0.18	0.02	0.16	0.01	0.01	0.01	0.01	3.36E-04	182	0.01	0.00	183	10.44	3,772	5.10
Aug-09	0.19	0.02	0.16	0.01	0.01	0.01	0.01	3.28E-04	194	0.01	0.00	195	9.52	3,927	5.10
Sep-09	0.19	0.02	0.16	0.01	0.01	0.01	0.01	2.94E-04	197	0.01	0.00	198	9.95	3,955	5.11
Oct-09	0.18	0.02	0.16	0.01	0.01	0.01	0.01	2.62E-04	191	0.01	0.00	192	9.09	3,770	4.89
Nov-09	0.16	0.01	0.13	0.01	0.01	0.01	0.01	2.12E-04	161	0.01	0.00	162	9.48	3,273	4.36
Dec-09	0.19	0.01	0.16	0.01	0.01	0.01	0.01	1.60E-04	215	0.01	0.00	216	5.65	3,894	4.42
Jan-10	0.22	0.02	0.18	0.02	0.02	0.02	0.01	2.31E-04	212	0.01	0.00	213	9.70	4,446	5.21
Feb-10	0.19	0.02	0.16	0.01	0.01	0.01	0.01	3.24E-04	182	0.01	0.00	183	9.98	3,782	5.09
Mar-10	0.04	0.00	0.03	0.00	0.00	0.00	0.00	1.26E-05	43	0.00	0.00	44	1.25	743	0.77
Apr-10	0.19	0.01	0.16	0.01	0.01	0.01	0.01	1.37E-04	215	0.01	0.00	216	7.05	3,779	3.78
May-10	0.11	0.01	0.09	0.01	0.01	0.01	0.01	1.48E-04	109	0.01	0.00	109	10.74	2,224	2.91
Jun-10	0.11	0.01	0.09	0.01	0.01	0.01	0.01	1.56E-04	106	0.01	0.00	107	10.39	2,165	2.81
Jul-10	0.20	0.03	0.17	0.02	0.02	0.02	0.01	3.79E-04	193	0.01	0.00	194	10.75	4,058	5.52
Aug-10	0.22	0.03	0.18	0.02	0.02	0.02	0.01	3.82E-04	217	0.01	0.00	218	10.87	4,445	5.86
Sep-10	0.20	0.02	0.17	0.02	0.02	0.02	0.01	2.39E-04	199	0.01	0.00	200	10.57	4,082	5.36
Oct-10	0.20	0.01	0.17	0.02	0.02	0.02	0.01	2.21E-04	214	0.01	0.00	215	10.09	4,108	4.92
Nov-10	0.21	0.01	0.17	0.02	0.02	0.02	0.01	1.52E-04	238	0.01	0.00	239	7.84	4,238	4.63
Dec-10	0.21	0.01	0.18	0.02	0.02	0.02	0.01	2.17E-04	211	0.01	0.00	212	10.24	4,340	5.71
Jan-11	0.23	0.02	0.19	0.02	0.02	0.02	0.01	2.97E-04	245	0.02	0.00	246	9.00	4,665	5.55
Feb-11	0.21	0.02	0.17	0.02	0.02	0.02	0.01	2.59E-04	210	0.01	0.00	211	9.46	4,237	5.52
Mar-11	0.24	0.02	0.21	0.02	0.02	0.02	0.01	3.14E-04	255	0.02	0.00	257	10.11	4,995	6.27
Apr-11	0.20	0.02	0.17	0.02	0.02	0.02	0.01	2.56E-04	208	0.01	0.00	209	9.98	4,093	5.15
May-11	0.23	0.02	0.19	0.02	0.02	0.02	0.01	2.85E-04	232	0.02	0.00	233	9.85	4,735	6.23
Jun-11	0.22	0.02	0.18	0.02	0.02	0.02	0.01	2.42E-04	227	0.01	0.00	228	9.25	4,447	5.47

Attachment B-7
Baseline Actual Emission Calculations for UFU Regeneration Heater

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	UFU	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	2.15	0.19	1.77	0.16	0.16	0.16	0.12	0.00	2,298	0.15	0.03	2,311	--	--	--
Monthly Maximum Throughput During Baseline:	4,456	6.32	4,669	4,669	4,669	4,669	4,669	6.27	6.27	6.27	6.27	6.27	10.87	4,995	6.32
Occurs:	Jan-09	Jul-08	Jul-08	Jul-08	Jul-08	Jul-08	Jul-08	Mar-11	Mar-11	Mar-11	Mar-11	Mar-11	Aug-10	Mar-11	Jul-08

Emission Factor References

[1] Emission factor of 0.098 lb/MMBtu per AP-42 Table 1.4-1.

[2] Calculated as follows: SO2 (tons) = Monthly average fuel gas H2S contents (ppmv) * 10^6 / 385.34 ft3/lb-mol * 64 lb/lb-mol * MMscf / 2000 lb/ton.

[3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.

[4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.

[8] Assumed to be 1.5% of total SO2 emissions consistent with TRI reporting.

[9] Calculated as follows: CO2 (tons) = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg * 10^6 scf/MMscf * MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.
CH4 (tons) = 0.003 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
N2O (tons) = 0.0006 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
CO2e (tons) = CO2 (tons) + 21 * CH4 (tons) + 310 * N2O (tons) per Table A-1 of 40 CFR 98.

[10] Measured throughput rates.

Attachment B-8
Projected Actual Emission Calculations for UFU Regeneration Heater

Quantity	Value	Units	Reference
Projected Firing Rate:	5.92	Mscf/hr	Calculated
	6.50	MMBtu/hr	Engineering estimate
Fuel HHV:	1098.55	Btu/scf	Engineering estimate
Fuel H_2S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	9.80E-02	lb/MMBtu	0.64	2.79	AP-42 Table 1.4-1
SO_2	8.31	lb/MMscf	4.91E-02	0.22	Calculated
CO	8.24E-02	lb/MMBtu	0.54	2.34	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	4.84E-02	0.21	AP-42 Table 1.4-2
PM_{10}	7.45E-03	lb/MMBtu	4.84E-02	0.21	AP-42 Table 1.4-2
$PM_{2.5}$	7.45E-03	lb/MMBtu	4.84E-02	0.21	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	3.50E-02	0.15	AP-42 Table 1.4-2
H_2SO_4	0.12	lb/MMscf	7.37E-04	3.23E-03	TRI calculation (1.5% of SO2 emissions)
CO_2 [3]	143,822.95	lb/MMscf	850.98	3,727.31	2008-2011 Monitoring
CH_4 [4]	7.27	lb/MMscf	4.30E-02	0.19	40 CFR 98 Subpart C
N_2O [5]	1.45	lb/MMscf	8.60E-03	3.77E-02	40 CFR 98 Subpart C
CO_2e [6]	144,426.00	lb/MMscf	854.55	3,742.94	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf
[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
[3] Emission Factor calculated from 2008-2011 monitoring data per Equation C-5 of 40 CFR 98
[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-8
Projected Actual Emission Calculations for UFU Regeneration Heater

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	2.15	0.19	1.77	0.16	0.16	0.16	0.12	0.00	2,311	Attachment B-7
B. Capable of Accommodating	2.52	0.30	2.22	0.20	0.20	0.20	0.15	0.00	4,127	See below.
C. Projected Emissions	2.79	0.22	2.34	0.21	0.21	0.21	0.15	0.00	3,743	
D. Demand Growth (D=B-A)	0.37	0.11	0.45	0.04	0.04	0.04	0.02	0.00	1,816	
E. Projected Actual Emissions (E=C-D)	2.42	0.11	1.89	0.17	0.17	0.17	0.13	0.00	1,926	
F. Emission Increase (F=E-A)	0.27	0.00	0.13	0.01	0.01	0.01	0.01	0.00	0	

B. Capable of Accommodating	**NOx**	**SO2**	**CO**	**PM**	**PM10**	**PM2.5**	**VOC**	**H2SO4**	**GHG (CO2e)**	**Notes**
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	4,456	6.32	4,669	4,669	4,669	4,669	4,669	6.27	6.27	
Month that this occurred:	Jan-09	Jul-08	Jul-08	Jul-08	Jul-08	Jul-08	Jul-08	Mar-11	Mar-11	
Throughput that Unit was Capable of Accommodating (Units/year)	51,420	72.98	53,877	53,877	53,877	53,877	53,877	72.33	72.33	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.098	8.31	0.08	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	2.52	0.30	2.22	0.20	0.20	0.20	0.15	0.00	4,127	

Attachment B-9
Baseline Actual Emission Calculations for DDU Charge Heater F-680

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Distillate	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	0.05	0.01	0.08	0.01	0.01	0.01	0.01	8.67E-05	88	6.45E-03	1.29E-03	88	8.60	1,956	2.89
Feb-08	0.11	0.01	0.18	0.02	0.02	0.02	0.01	1.68E-04	217	1.47E-02	2.94E-03	218	10.62	4,448	5.97
Mar-08	0.10	0.01	0.16	0.01	0.01	0.01	0.01	2.07E-04	177	1.31E-02	2.62E-03	178	11.93	3,972	6.22
Apr-08	0.10	0.02	0.18	0.02	0.02	0.02	0.01	2.96E-04	186	1.40E-02	2.81E-03	187	9.76	4,254	6.46
May-08	0.08	0.01	0.13	0.01	0.01	0.01	0.01	2.14E-04	140	1.04E-02	2.08E-03	141	10.09	3,150	4.72
Jun-08	0.10	0.03	0.17	0.02	0.02	0.02	0.01	4.53E-04	210	1.36E-02	2.71E-03	212	12.58	4,112	5.13
Jul-08	0.11	0.04	0.18	0.02	0.02	0.02	0.01	5.42E-04	213	1.44E-02	2.89E-03	214	12.54	4,374	5.93
Aug-08	0.09	0.02	0.15	0.01	0.01	0.01	0.01	2.86E-04	164	1.19E-02	2.38E-03	165	12.80	3,609	5.38
Sep-08	0.11	0.02	0.18	0.02	0.02	0.02	0.01	2.78E-04	195	1.42E-02	2.84E-03	196	13.56	4,299	6.42
Oct-08	0.14	0.02	0.24	0.02	0.02	0.02	0.02	2.85E-04	277	1.89E-02	3.78E-03	279	14.66	5,731	7.91
Nov-08	0.14	0.01	0.18	0.02	0.02	0.02	0.01	1.64E-04	220	1.46E-02	2.91E-03	221	9.21	4,416	5.76
Dec-08	0.18	0.01	0.23	0.02	0.02	0.02	0.02	1.91E-04	290	1.86E-02	3.73E-03	291	11.65	5,651	6.98
Jan-09	0.19	0.02	0.25	0.02	0.02	0.02	0.02	2.67E-04	319	1.97E-02	3.95E-03	321	12.14	5,983	7.01
Feb-09	0.21	0.01	0.26	0.02	0.02	0.02	0.02	1.89E-04	325	2.10E-02	4.19E-03	326	11.75	6,353	8.10
Mar-09	0.21	0.02	0.26	0.02	0.02	0.02	0.02	3.60E-04	336	2.11E-02	4.22E-03	338	12.86	6,394	9.58
Apr-09	0.35	0.05	0.45	0.04	0.04	0.04	0.03	6.85E-04	537	3.60E-02	7.20E-03	540	13.31	10,907	14.63
May-09	0.37	0.05	0.47	0.04	0.04	0.04	0.03	7.06E-04	570	3.80E-02	7.61E-03	573	13.39	11,524	15.31
Jun-09	0.31	0.05	0.39	0.04	0.04	0.04	0.03	6.78E-04	455	3.16E-02	6.32E-03	457	12.17	9,576	13.02
Jul-09	0.34	0.06	0.43	0.04	0.04	0.04	0.03	9.71E-04	526	3.60E-02	7.19E-03	529	14.11	10,348	14.74
Aug-09	0.38	0.06	0.48	0.04	0.04	0.04	0.03	9.66E-04	572	3.81E-02	7.63E-03	575	13.50	11,557	15.00
Sep-09	0.34	0.05	0.43	0.04	0.04	0.04	0.03	7.85E-04	525	3.49E-02	6.97E-03	528	13.56	10,563	13.65
Oct-09	0.23	0.03	0.29	0.03	0.03	0.03	0.02	4.88E-04	356	2.32E-02	4.64E-03	358	11.58	7,030	9.12
Nov-09	0.21	0.03	0.27	0.02	0.02	0.02	0.02	4.27E-04	323	2.18E-02	4.35E-03	325	13.17	6,591	8.79
Dec-09	0.20	0.02	0.25	0.02	0.02	0.02	0.02	2.55E-04	342	2.05E-02	4.10E-03	344	10.92	6,162	7.04
Jan-10	0.27	0.03	0.34	0.03	0.03	0.03	0.02	4.34E-04	399	2.58E-02	5.16E-03	401	12.75	8,357	9.79
Feb-10	0.14	0.02	0.18	0.02	0.02	0.02	0.01	3.73E-04	210	1.44E-02	2.88E-03	211	10.69	4,365	5.87
Mar-10	0.05	0.00	0.06	0.01	0.01	0.01	0.00	2.40E-05	83	4.68E-03	9.36E-04	83	1.74	1,419	1.47
Apr-10	0.20	0.01	0.25	0.02	0.02	0.02	0.02	2.24E-04	351	2.03E-02	4.07E-03	352	10.67	6,166	6.17
May-10	0.32	0.04	0.40	0.04	0.04	0.04	0.03	6.46E-04	475	3.21E-02	6.42E-03	478	14.60	9,721	12.72
Jun-10	0.39	0.06	0.50	0.05	0.05	0.05	0.03	8.72E-04	593	3.99E-02	7.99E-03	596	14.69	12,101	15.73
Jul-10	0.33	0.06	0.42	0.04	0.04	0.04	0.03	9.58E-04	487	3.39E-02	6.78E-03	490	14.09	10,271	13.97
Aug-10	0.43	0.08	0.55	0.05	0.05	0.05	0.04	1.14E-03	645	4.37E-02	8.74E-03	649	15.12	13,249	17.47
Sep-10	0.47	0.06	0.60	0.05	0.05	0.05	0.04	8.47E-04	706	4.78E-02	9.55E-03	710	15.45	14,473	19.01
Oct-10	0.52	0.06	0.66	0.06	0.06	0.06	0.04	8.60E-04	832	5.27E-02	1.05E-02	837	14.95	15,965	19.13
Nov-10	0.37	0.03	0.47	0.04	0.04	0.04	0.03	4.12E-04	644	3.79E-02	7.58E-03	647	10.42	11,484	12.55
Dec-10	0.52	0.05	0.66	0.06	0.06	0.06	0.04	7.96E-04	775	5.26E-02	1.05E-02	779	13.49	15,941	20.98
Jan-11	0.50	0.06	0.63	0.06	0.06	0.06	0.04	9.73E-04	802	5.04E-02	1.01E-02	806	12.69	15,286	18.18
Feb-11	0.30	0.04	0.38	0.03	0.03	0.03	0.02	5.59E-04	452	3.01E-02	6.02E-03	455	9.79	9,122	11.88
Mar-11	0.50	0.06	0.64	0.06	0.06	0.06	0.04	9.72E-04	790	5.10E-02	1.02E-02	794	15.20	15,454	19.40
Apr-11	0.27	0.07	0.65	0.06	0.06	0.06	0.04	9.82E-04	798	5.19E-02	1.04E-02	802	15.99	15,723	19.77
May-11	0.26	0.06	0.64	0.06	0.06	0.06	0.04	9.38E-04	764	5.14E-02	1.03E-02	768	15.26	15,583	20.49
Jun-11	0.26	0.06	0.64	0.06	0.06	0.06	0.04	8.39E-04	788	5.09E-02	1.02E-02	792	14.04	15,434	18.98

Attachment B-9
Baseline Actual Emission Calculations for DDU Charge Heater F-680

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Distillate	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	3.51	0.34	3.40	0.31	0.31	0.31	0.21	0.01	6,453	0.42	0.08	6,488	--	--	--
Monthly Maximum Throughput During Baseline:	15,965	15.31	11,557	11,557	11,557	11,557	11,557	20.98	20.98	20.98	20.98	20.98	15.99	15,965	20.98
Occurs:	Oct-10	May-09	Aug-09	Aug-09	Aug-09	Aug-09	Aug-09	Dec-10	Dec-10	Dec-10	Dec-10	Dec-10	Apr-11	Oct-10	Dec-10

Emission Factor References

[1] Jan-08 through Oct-08: 5/5/05 stack test results of 0.049 lb/MMBtu.
Nov-08 through Mar-11: 5/30/08 stack test results of 0.065 lb/MMBtu.
Apr-11 through Jun-11: 3/8/11 stack test results of 0.034 lb/MMBtu.

[2] Calculated as follows: SO2 (tons) = Monthly average fuel gas H2S contents (ppmv) * 10^6 / 385.34 ft3/lb-mol * 64 lb/lb-mol * MMscf / 2000 lb/ton.

[3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.

[4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.

[8] Assumed to be 1.5% of total SO2 emissions consistent with TRI reporting.

[9] Calculated as follows: CO2 (tons) = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg * 10^6 scf/MMscf * MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.
CH4 (tons) = 0.003 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
N2O (tons) = 0.0006 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
CO2e (tons) = CO2 (tons) + 21 * CH4 (tons) + 310 * N2O (tons) per Table A-1 of 40 CFR 98.

[10] Measured throughput rates.

Attachment B-10
Projected Actual Emission Calculations for DDU Charge Heater F-680

Quantity	Value	Units	Reference
Projected Firing Rate:	13.65	Mscf/hr	Calculated
	15.00	MMBtu/hr	Engineering estimate
Fuel HHV:	1098.55	Btu/scf	Engineering estimate
Fuel H_2S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	0.065	lb/MMBtu	0.98	4.27	5/30/08 Stack Test Results
SO_2	8.31	lb/MMscf	0.11	0.50	Calculated
CO	8.24E-02	lb/MMBtu	1.24	5.41	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	0.11	0.49	AP-42 Table 1.4-2
PM_{10}	7.45E-03	lb/MMBtu	0.11	0.49	AP-42 Table 1.4-2
$PM_{2.5}$	7.45E-03	lb/MMBtu	0.11	0.49	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	8.09E-02	0.35	AP-42 Table 1.4-2
H_2SO_4	0.12	lb/MMscf	1.70E-03	7.45E-03	TRI calculation (1.5% of SO2 emissions)
CO_2 [3]	143,822.95	lb/MMscf	1,963.81	8,601.49	2008-2011 Monitoring
CH_4 [4]	7.27	lb/MMscf	9.92E-02	0.43	40 CFR 98 Subpart C
N_2O [5]	1.45	lb/MMscf	1.98E-02	8.69E-02	40 CFR 98 Subpart C
CO_2e [6]	144,426.00	lb/MMscf	1,972.04	8,637.56	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf
[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
[3] Emission Factor calculated from 2008-2011 monitoring data per Equation C-5 of 40 CFR 98
[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-10
Projected Actual Emission Calculations for DDU Charge Heater F-680

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	3.51	0.34	3.40	0.31	0.31	0.31	0.21	0.01	6,488	Attachment B-9
B. Capable of Accommodating	5.99	0.73	5.49	0.50	0.50	0.50	0.36	0.02	13,816	See below.
C. Projected Emissions	4.27	0.50	5.41	0.49	0.49	0.49	0.35	0.01	8,638	
D. Demand Growth (D=B-A)	2.47	0.39	2.09	0.19	0.19	0.19	0.15	0.01	7,328	
E. Projected Actual Emissions (E=C-D)	1.80	0.11	3.32	0.30	0.30	0.30	0.20	0.00	1,310	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	

B. Capable of Accommodating	**NOx**	**SO2**	**CO**	**PM**	**PM10**	**PM2.5**	**VOC**	**H2SO4**	**GHG (CO2e)**	**Notes**
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	15,965	15.31	11,557	11,557	11,557	11,557	11,557	20.98	20.98	
Month that this occurred:	Oct-10	May-09	Aug-09	Aug-09	Aug-09	Aug-09	Aug-09	Dec-10	Dec-10	
Throughput that Unit was Capable of Accommodating (Units/year)	184,210	176.65	133,349	133,349	133,349	133,349	133,349	242.11	242.11	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.065	8.31	0.0824	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	5.99	0.73	5.49	0.50	0.50	0.50	0.36	0.02	13,816	

Attachment B-11
Baseline Actual Emission Calculations for DDU Rerun Reboiler F-681

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Distillate	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	0.17	0.02	0.26	0.02	0.02	0.02	0.02	2.81E-04	285	0.02	4.19E-03	286	8.60	6,349	9.39
Feb-08	0.22	0.02	0.35	0.03	0.03	0.03	0.02	3.21E-04	414	0.03	5.60E-03	416	10.62	8,487	11.39
Mar-08	0.20	0.03	0.31	0.03	0.03	0.03	0.02	3.97E-04	340	0.03	5.04E-03	342	11.93	7,643	11.97
Apr-08	0.16	0.03	0.25	0.02	0.02	0.02	0.02	4.28E-04	269	0.02	4.06E-03	270	9.76	6,155	9.35
May-08	0.20	0.04	0.32	0.03	0.03	0.03	0.02	5.31E-04	346	0.03	5.15E-03	348	10.09	7,804	11.70
Jun-08	0.24	0.07	0.38	0.03	0.03	0.03	0.03	1.03E-03	478	0.03	6.16E-03	480	12.58	9,333	11.65
Jul-08	0.26	0.08	0.41	0.04	0.04	0.04	0.03	1.25E-03	489	0.03	6.63E-03	492	12.54	10,053	13.62
Aug-08	0.26	0.05	0.42	0.04	0.04	0.04	0.03	8.04E-04	461	0.03	6.70E-03	464	12.80	10,152	15.14
Sep-08	0.27	0.04	0.43	0.04	0.04	0.04	0.03	6.75E-04	473	0.03	6.89E-03	475	13.56	10,436	15.58
Oct-08	0.31	0.04	0.49	0.04	0.04	0.04	0.03	5.88E-04	571	0.04	7.79E-03	574	14.66	11,810	16.31
Nov-08	0.30	0.02	0.40	0.04	0.04	0.04	0.03	3.61E-04	484	0.03	6.41E-03	487	9.21	9,714	12.66
Dec-08	0.35	0.03	0.47	0.04	0.04	0.04	0.03	3.85E-04	584	0.04	7.52E-03	587	11.65	11,389	14.06
Jan-09	0.34	0.03	0.46	0.04	0.04	0.04	0.03	4.97E-04	593	0.04	7.33E-03	596	12.14	11,107	13.01
Feb-09	0.31	0.02	0.41	0.04	0.04	0.04	0.03	2.99E-04	512	0.03	6.61E-03	514	11.75	10,016	12.77
Mar-09	0.28	0.03	0.37	0.03	0.03	0.03	0.02	5.13E-04	479	0.03	6.01E-03	481	12.86	9,106	13.64
Apr-09	0.31	0.04	0.41	0.04	0.04	0.04	0.03	6.26E-04	491	0.03	6.58E-03	493	13.31	9,970	13.37
May-09	0.32	0.04	0.42	0.04	0.04	0.04	0.03	6.24E-04	503	0.03	6.72E-03	506	13.39	10,185	13.53
Jun-09	0.27	0.04	0.36	0.03	0.03	0.03	0.02	6.23E-04	418	0.03	5.81E-03	420	12.17	8,799	11.96
Jul-09	0.28	0.06	0.37	0.03	0.03	0.03	0.02	8.42E-04	456	0.03	6.23E-03	458	14.11	8,968	12.77
Aug-09	0.31	0.05	0.41	0.04	0.04	0.04	0.03	8.23E-04	487	0.03	6.50E-03	490	13.50	9,847	12.78
Sep-09	0.30	0.05	0.40	0.04	0.04	0.04	0.03	7.28E-04	487	0.03	6.46E-03	490	13.56	9,793	12.66
Oct-09	0.26	0.04	0.34	0.03	0.03	0.03	0.02	5.75E-04	419	0.03	5.46E-03	422	11.58	8,279	10.74
Nov-09	0.27	0.04	0.36	0.03	0.03	0.03	0.02	5.62E-04	426	0.03	5.73E-03	428	13.17	8,679	11.57
Dec-09	0.26	0.02	0.34	0.03	0.03	0.03	0.02	3.41E-04	459	0.03	5.50E-03	462	10.92	8,264	9.44
Jan-10	0.26	0.03	0.35	0.03	0.03	0.03	0.02	4.42E-04	407	0.03	5.27E-03	409	12.75	8,521	9.98
Feb-10	0.17	0.03	0.22	0.02	0.02	0.02	0.01	4.64E-04	261	0.02	3.58E-03	263	10.69	5,424	7.30
Mar-10	0.04	0.00	0.06	0.01	0.01	0.01	0.00	2.39E-05	82	0.00	9.32E-04	83	1.74	1,412	1.46
Apr-10	0.29	0.02	0.38	0.03	0.03	0.03	0.02	3.36E-04	525	0.03	6.10E-03	528	10.67	9,239	9.25
May-10	0.32	0.05	0.43	0.04	0.04	0.04	0.03	6.91E-04	508	0.03	6.86E-03	511	14.60	10,398	13.60
Jun-10	0.31	0.05	0.41	0.04	0.04	0.04	0.03	7.23E-04	492	0.03	6.63E-03	495	14.69	10,040	13.05
Jul-10	0.31	0.06	0.41	0.04	0.04	0.04	0.03	9.31E-04	474	0.03	6.59E-03	476	14.09	9,981	13.58
Aug-10	0.34	0.06	0.46	0.04	0.04	0.04	0.03	9.53E-04	539	0.04	7.31E-03	542	15.12	11,072	14.60
Sep-10	0.40	0.05	0.53	0.05	0.05	0.05	0.03	7.56E-04	630	0.04	8.52E-03	633	15.45	12,909	16.96
Oct-10	0.43	0.05	0.57	0.05	0.05	0.05	0.04	7.49E-04	725	0.05	9.18E-03	729	14.95	13,904	16.66
Nov-10	0.29	0.02	0.39	0.04	0.04	0.04	0.03	3.39E-04	530	0.03	6.24E-03	533	10.42	9,459	10.34
Dec-10	0.34	0.04	0.45	0.04	0.04	0.04	0.03	5.50E-04	536	0.04	7.28E-03	539	13.49	11,025	14.51
Jan-11	0.37	0.05	0.49	0.04	0.04	0.04	0.03	7.56E-04	623	0.04	7.84E-03	626	12.69	11,880	14.13
Feb-11	0.21	0.03	0.27	0.02	0.02	0.02	0.02	4.06E-04	329	0.02	4.38E-03	331	9.79	6,634	8.64
Mar-11	0.39	0.05	0.52	0.05	0.05	0.05	0.03	7.90E-04	642	0.04	8.29E-03	646	15.20	12,567	15.77
Apr-11	0.28	0.05	0.48	0.04	0.04	0.04	0.03	7.21E-04	586	0.04	7.62E-03	589	15.99	11,551	14.53
May-11	0.28	0.05	0.47	0.04	0.04	0.04	0.03	6.82E-04	555	0.04	7.47E-03	558	15.26	11,322	14.89
Jun-11	0.26	0.04	0.44	0.04	0.04	0.04	0.03	5.77E-04	542	0.04	7.01E-03	545	14.04	10,619	13.06

Attachment B-11
Baseline Actual Emission Calculations for DDU Rerun Reboiler F-681

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Distillate	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	3.51	0.48	4.55	0.41	0.41	0.41	0.30	0.01	5,799	0.38	0.08	5,830	--	--	--
Monthly Maximum Throughput During Baseline:	13,904	16.31	11,810	11,810	11,810	11,810	11,810	16.96	16.96	16.96	16.96	16.96	15.99	13,904	16.96
Occurs:	Oct-10	Oct-08	Oct-08	Oct-08	Oct-08	Oct-08	Oct-08	Sep-10	Sep-10	Sep-10	Sep-10	Sep-10	Apr-11	Oct-10	Sep-10

Emission Factor References

[1] Jan-08 through Oct-08: 5/10/05 stack test results of 0.052 lb/MMBtu.
Nov-08 through Mar-11: 10/24/08 stack test results of 0.062 lb/MMBtu.
Apr-11 through Jun-11: 3/8/11 stack test results of 0.049 lb/MMBtu.

[2] Calculated as follows: SO2 (tons) = Monthly average fuel gas H2S contents (ppmv) * 10^6 / 385.34 ft3/lb-mol * 64 lb/lb-mol * MMscf / 2000 lb/ton.

[3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.

[4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.

[7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.

[8] Assumed to be 1.5% of total SO2 emissions consistent with TRI reporting.

[9] Calculated as follows: CO2 (tons) = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg * 10^6 scf/MMscf * MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.
CH4 (tons) = 0.003 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
N2O (tons) = 0.0006 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
GHG mass (tons) = CO2 (tons) + CH4 (tons) + N2O (tons).

[10] Measured throughput rates.

Attachment B-12
Projected Actual Emission Calculations for DDU Rerun Reboiler F-681

Quantity	Value	Units	Reference
Projected Firing Rate:	18.21	Mscf/hr	Calculated
	20.00	MMBtu/hr	Engineering estimate
Fuel HHV:	1098.55	Btu/scf	Engineering estimate
Fuel H_2S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	0.062	lb/MMBtu	1.24	5.43	10/24/08 Stack Test Results
SO_2	8.31	lb/MMscf	0.15	0.66	Calculated
CO	8.24E-02	lb/MMBtu	1.65	7.21	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	0.15	0.65	AP-42 Table 1.4-2
PM_{10}	7.45E-03	lb/MMBtu	0.15	0.65	AP-42 Table 1.4-2
$PM_{2.5}$	7.45E-03	lb/MMBtu	0.15	0.65	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	0.11	0.47	AP-42 Table 1.4-2
H_2SO_4	0.12	lb/MMscf	2.27E-03	9.93E-03	TRI calculation (1.5% of SO2 emissions)
CO_2 [3]	143,822.95	lb/MMscf	2,618.41	11,468.65	40 CFR 98 Subpart C
CH_4 [4]	7.27	lb/MMscf	0.13	0.58	40 CFR 98 Subpart C
N_2O [5]	1.45	lb/MMscf	2.65E-02	0.12	40 CFR 98 Subpart C
CO_2e [6]	144,426.00	lb/MMscf	2,629.39	11,516.74	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg per Equation C-5 of 40 CFR 98

[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-12
Projected Actual Emission Calculations for DDU Rerun Reboiler F-681

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	3.51	0.48	4.55	0.41	0.41	0.41	0.30	7.40E-03	5,830	Attachment B-11
B. Capable of Accommodating	4.97	0.78	5.61	0.51	0.51	0.51	0.37	1.26E-02	11,538	See below.
C. Projected Emissions	5.43	0.66	7.21	0.65	0.65	0.65	0.47	9.93E-03	11,517	
D. Demand Growth (D=B-A)	1.46	0.31	1.06	0.10	0.10	0.10	0.07	5.19E-03	5,708	
E. Projected Actual Emissions (E=C-D)	3.97	0.36	6.15	0.56	0.56	0.56	0.40	4.74E-03	5,809	
F. Emission Increase (F=E-A)	0.46	0.00	1.60	0.15	0.15	0.15	0.10	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	13,904	16.31	11,810	11,810	11,810	11,810	11,810	16.96	16.96	
Month that this occurred:	Oct-10	Oct-08	Oct-08	Oct-08	Oct-08	Oct-08	Oct-08	Sep-10	Sep-10	
Throughput that Unit was Capable of Accommodating (Units/year)	160,434	188.20	136,274	136,274	136,274	136,274	136,274	202.19	202.19	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.062	8.31	0.0824	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	4.97	0.78	5.61	0.51	0.51	0.51	0.37	0.01	11,538	

Attachment B-13
Baseline Actual Emission Calculations for SRU/TGI

Date	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Sulfur Feed Rate	Sour Gas Flow	Fuel Gas Firing		SO2 24-mo Rolling
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	LT	Mscf	MMBtu	MMscf	tpy
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]	[10]	[11]
Jan-08	0.10	26.70	0.08	7.64E-03	7.64E-03	7.64E-03	5.53E-03	0.27	269	6.77E-03	1.35E-03	269	278	15,461	2,052	3.04	
Feb-08	0.10	28.41	0.09	7.88E-03	7.88E-03	7.88E-03	5.70E-03	0.28	266	6.98E-03	1.40E-03	267	260	14,279	2,116	2.84	
Mar-08	0.09	34.33	0.08	7.22E-03	7.22E-03	7.22E-03	5.22E-03	0.34	267	6.40E-03	1.28E-03	268	305	15,834	1,938	3.04	
Apr-08	0.09	25.12	0.08	7.21E-03	7.21E-03	7.21E-03	5.22E-03	0.25	240	6.38E-03	1.28E-03	241	266	13,618	1,934	2.94	
May-08	0.10	13.83	0.08	7.55E-03	7.55E-03	7.55E-03	5.46E-03	0.14	268	6.68E-03	1.34E-03	269	299	15,617	2,026	3.04	
Jun-08	0.12	19.81	0.10	8.77E-03	8.77E-03	8.77E-03	6.35E-03	0.20	302	7.77E-03	1.55E-03	303	320	15,915	2,354	2.94	
Jul-08	0.11	15.11	0.09	8.35E-03	8.35E-03	8.35E-03	6.04E-03	0.15	300	7.40E-03	1.48E-03	301	342	16,743	2,241	3.04	
Aug-08	0.10	20.05	0.08	7.58E-03	7.58E-03	7.58E-03	5.49E-03	0.20	281	6.72E-03	1.34E-03	282	332	16,555	2,035	3.04	
Sep-08	0.10	24.99	0.08	7.33E-03	7.33E-03	7.33E-03	5.30E-03	0.25	273	6.49E-03	1.30E-03	273	312	16,077	1,968	2.94	
Oct-08	0.11	25.86	0.09	8.19E-03	8.19E-03	8.19E-03	5.93E-03	0.26	305	7.25E-03	1.45E-03	305	345	17,367	2,198	3.04	
Nov-08	0.11	22.86	0.09	8.40E-03	8.40E-03	8.40E-03	6.08E-03	0.23	268	7.44E-03	1.49E-03	269	263	13,669	2,254	2.94	
Dec-08	0.12	20.54	0.10	9.16E-03	9.16E-03	9.16E-03	6.63E-03	0.21	287	8.12E-03	1.62E-03	287	271	14,066	2,459	3.04	
Jan-09	0.13	24.54	0.11	9.65E-03	9.65E-03	9.65E-03	6.99E-03	0.25	302	8.55E-03	1.71E-03	302	288	14,303	2,591	3.04	
Feb-09	0.11	22.03	0.09	8.01E-03	8.01E-03	8.01E-03	5.80E-03	0.22	235	7.10E-03	1.42E-03	236	214	10,983	2,151	2.74	
Mar-09	0.10	25.00	0.08	7.55E-03	7.55E-03	7.55E-03	5.46E-03	0.25	255	6.69E-03	1.34E-03	256	279	13,031	2,026	3.04	
Apr-09	0.11	29.13	0.09	8.16E-03	8.16E-03	8.16E-03	5.91E-03	0.29	283	7.23E-03	1.45E-03	283	313	15,312	2,191	2.94	
May-09	0.11	38.82	0.09	8.51E-03	8.51E-03	8.51E-03	6.16E-03	0.39	308	7.54E-03	1.51E-03	308	359	17,058	2,285	3.04	
Jun-09	0.11	33.50	0.09	8.05E-03	8.05E-03	8.05E-03	5.83E-03	0.33	273	7.13E-03	1.43E-03	274	316	14,919	2,161	2.94	
Jul-09	0.10	33.31	0.09	7.94E-03	7.94E-03	7.94E-03	5.75E-03	0.33	289	7.41E-03	1.48E-03	289	334	15,795	2,132	3.04	
Aug-09	0.11	32.99	0.10	8.71E-03	8.71E-03	8.71E-03	6.30E-03	0.33	295	7.72E-03	1.54E-03	296	321	15,733	2,338	3.04	
Sep-09	0.11	30.55	0.09	8.47E-03	8.47E-03	8.47E-03	6.13E-03	0.31	290	7.50E-03	1.50E-03	291	318	15,487	2,273	2.94	
Oct-09	0.11	31.13	0.10	8.71E-03	8.71E-03	8.71E-03	6.31E-03	0.31	286	7.72E-03	1.54E-03	286	298	14,640	2,339	3.04	
Nov-09	0.11	29.73	0.09	8.21E-03	8.21E-03	8.21E-03	5.94E-03	0.30	266	7.27E-03	1.45E-03	267	285	13,830	2,204	2.94	
Dec-09	0.13	25.60	0.11	9.90E-03	9.90E-03	9.90E-03	7.16E-03	0.26	296	8.83E-03	1.77E-03	296	259	12,965	2,656	3.04	316.99
Jan-10	0.13	31.52	0.11	9.65E-03	9.65E-03	9.65E-03	6.99E-03	0.32	276	8.01E-03	1.60E-03	276	270	13,310	2,591	3.04	319.39
Feb-10	0.10	23.48	0.08	7.59E-03	7.59E-03	7.59E-03	5.50E-03	0.23	227	6.73E-03	1.35E-03	227	243	11,270	2,038	2.74	316.92
Mar-10	0.14	13.17	0.12	1.09E-02	1.09E-02	1.09E-02	7.89E-03	0.13	238	9.66E-03	1.93E-03	239	116	5,880	2,927	3.04	306.34
Apr-10	0.14	14.56	0.12	1.09E-02	1.09E-02	1.09E-02	7.91E-03	0.15	280	9.68E-03	1.94E-03	280	200	9,872	2,934	2.94	301.06
May-10	0.11	16.08	0.10	8.64E-03	8.64E-03	8.64E-03	6.26E-03	0.16	268	7.66E-03	1.53E-03	269	269	13,566	2,320	3.04	302.18
Jun-10	0.11	15.44	0.09	8.42E-03	8.42E-03	8.42E-03	6.09E-03	0.15	265	7.46E-03	1.49E-03	266	261	13,531	2,260	2.94	300.00
Jul-10	0.11	12.96	0.09	8.31E-03	8.31E-03	8.31E-03	6.02E-03	0.13	272	7.36E-03	1.47E-03	272	275	14,523	2,231	3.04	298.93
Aug-10	0.11	11.28	0.09	8.58E-03	8.58E-03	8.58E-03	6.21E-03	0.11	284	7.60E-03	1.52E-03	285	291	15,069	2,303	3.04	294.55
Sep-10	0.11	18.95	0.09	8.13E-03	8.13E-03	8.13E-03	5.89E-03	0.19	266	7.20E-03	1.44E-03	267	273	13,972	2,183	2.87	291.52
Oct-10	0.13	19.05	0.11	9.65E-03	9.65E-03	9.65E-03	6.99E-03	0.19	305	8.55E-03	1.71E-03	306	301	14,862	2,591	3.11	288.12
Nov-10	0.13	11.50	0.11	1.02E-02	1.02E-02	1.02E-02	7.36E-03	0.12	296	9.00E-03	1.80E-03	297	231	12,518	2,728	2.98	282.44
Dec-10	0.12	9.89	0.10	8.79E-03	8.79E-03	8.79E-03	6.36E-03	0.10	257	7.79E-03	1.56E-03	258	227	12,450	2,360	3.11	277.11
Jan-11	0.13	10.61	0.11	9.69E-03	9.69E-03	9.69E-03	7.01E-03	0.11	266	8.58E-03	1.72E-03	267	225	11,384	2,600	3.09	270.14
Feb-11	0.11	12.38	0.09	8.06E-03	8.06E-03	8.06E-03	5.83E-03	0.12	220	7.14E-03	1.43E-03	221	211	9,910	2,163	2.82	265.31
Mar-11	0.12	13.16	0.10	9.05E-03	9.05E-03	9.05E-03	6.55E-03	0.13	297	8.02E-03	1.60E-03	298	295	15,156	2,431	3.05	259.39
Apr-11	0.12	15.52	0.10	8.75E-03	8.75E-03	8.75E-03	6.34E-03	0.16	291	7.76E-03	1.55E-03	291	292	15,005	2,350	2.95	252.59
May-11	0.11	17.74	0.09	8.42E-03	8.42E-03	8.42E-03	6.10E-03	0.18	290	7.46E-03	1.49E-03	290	313	15,655	2,261	2.97	242.05
Jun-11	0.11	9.65	0.09	8.25E-03	8.25E-03	8.25E-03	5.97E-03	0.10	270	7.31E-03	1.46E-03	271	264	13,784	2,214	2.72	230.12

Attachment B-13
Baseline Actual Emission Calculations for SRU/TGI

Date	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Sulfur Feed Rate	Sour Gas Flow	Fuel Gas Firing		SO2 24-mo Rolling
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	LT	Mscf	MMBtu	MMscf	tpy
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]	[10]	[11]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--	--	--
Baseline Actual Emissions:	1.39	319.39	1.15	0.10	0.10	0.10	0.07	2.42	3,296	0.09	0.02	3,304	--	--	--	--	--
Monthly Maximum Throughput During Baseline:	2,934	3.04	2,934	2,934	2,934	2,934	2,656	15,795	3.11	3.11	3.11	3.11	359.38	17,367	2,934	3.11	319.39
Occurs:	Apr-10	Jan-08	Apr-10	Apr-10	Apr-10	Apr-10	Dec-09	Jul-09	Dec-10	Dec-10	Dec-10	Dec-10	May-09	Oct-08	Apr-10	Dec-10	Jan-10

References

[1] Emission factor of 0.0980 lb/MMBtu per AP-42 Table 1.4-1.
[2] Based on CEMS data.
[3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.
[4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
[5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
[6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
[7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.
[8] Assumed to be 1% of total SO2 emissions consistent with TRI reporting.
[9] Calculated as follows: CO2 (tons) = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg * 10^6 scf/MMscf * MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98 +
(Sour Gas Flow) * 44 / (849.5 scf/kg-mol) * 0.20 * 2.2 lb/kg / 2000 lb/ton per Equation Y-12 of 40 CFR 98.
CH4 (tons) = 0.003 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
N2O (tons) = 0.0006 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
CO2e (tons) = CO2 (tons) + 21 * CH4 (tons) + 310 * N2O (tons)
[10] Based on provided throughput rates.
[11] 24-month rolling annual average SO2 emissions calculated from monthly SO2 emissions.

Attachment B-14
Projected Actual Emission Calculations for SRU/TGI

Quantity	Value	Units	Reference
Projected Firing Rate:	6.01	Mscf/hr	Engineering estimate
	6.60	MMBtu/hr	Calculated
Fuel HHV:	1098.55	Btu/scf	Engineering estimate
SO2 Emissions:	60	tpy	Engineering estimate
Sour Gas Flow:	153,226	Mscf/yr	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	9.80E-02	lb/MMBtu	0.65	2.84	AP-42 Table 1.4-2
SO_2	--	--	13.70	60.00	Engineering estimate
CO	8.24E-02	lb/MMBtu	0.54	2.38	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	4.92E-02	0.22	AP-42 Table 1.4-2
PM_{10}	7.45E-03	lb/MMBtu	4.92E-02	0.22	AP-42 Table 1.4-2
$PM_{2.5}$	7.45E-03	lb/MMBtu	4.92E-02	0.22	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	3.56E-02	0.16	AP-42 Table 1.4-2
H_2SO_4	--	--	0.14	0.60	TRI calculation (1% of SO2 emissions)
CO2 [3]	143,822.95	lb/MMscf	864.46	3,786.32	40 CFR 98 Subpart C
	22.79	lb/Mscf sour gas	398.63	1,746.00	40 CFR 98 Subpart Y
CH_4 [4]	7.27	lb/MMscf	4.37E-02	0.19	40 CFR 98 Subpart C
N_2O [5]	1.45	lb/MMscf	8.73E-03	3.83E-02	40 CFR 98 Subpart C
CO_2e [6]	--	--	1,266.71	5,548.19	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg per Equation C-5 of 40 CFR 98
Emission Factor = 44 / (849.5 scf/kg-mol) * 0.20 * 1000 scf/Mscf * 2.2 lb/kg per Equation Y-12 of 40 CFR 98.

[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-14
Projected Actual Emission Calculations for SRU/TGI

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	1.39	319.39	1.15	0.10	0.10	0.10	0.07	2.42	3,304	Attachment B-13
B. Capable of Accommodating	1.71	N/A	1.44	0.13	0.13	0.13	0.08	2.90	4,666	See below.
C. Projected Emissions	2.84	60.00	2.38	0.22	0.22	0.22	0.16	0.60	5,548	
D. Demand Growth (D=B-A)	0.32	N/A	0.29	0.03	0.03	0.03	0.01	0.48	1,362	
E. Projected Actual Emissions (E=C-D)	2.52	60.00	2.09	0.19	0.19	0.19	0.14	0.12	4,186	
F. Emission Increase (F=E-A)	1.12	0.00	0.94	0.09	0.09	0.09	0.07	0.00	882	

B. Capable of Accommodating	**NOx**	**SO2**	**CO**	**PM**	**PM10**	**PM2.5**	**VOC**	**H2SO4**	**GHG (CO2e)**	**Notes**
Annual Emission Limits (ton/yr)	CAP	613.2	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	2,934	--	2,934	2,934	2,934	2,934	2,656	15,795	3.11	
Month that this occurred:	Apr-10	--	Apr-10	Apr-10	Apr-10	Apr-10	Dec-09	Jul-09	Dec-10	
Throughput that Unit was Capable of Accommodating (Units/year)	34,984	--	34,984	34,984	34,984	34,984	30,649	182,256	35.85	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.098	--	0.0824	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.03	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	Mscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	1.71	N/A	1.44	0.13	0.13	0.13	0.08	2.90	4,666	GHGs includes fuel gas firing and sour gas.

Annualized rate assumes a 95% capacity factor to account for unit downtime.
A federally enforceable emission limit of 60 tons of SO2 per year will be taken. Calculations are therefore on a baseline actual-to-potential basis.

SO2 emission reductions from installation of a tail gas treatment unit are included as part of the netting analysis.

Baseline Actual Emissions:	319.39	tpy
Proposed Emission Limit:	60.00	tpy
Net Change in Emissions:	-259.39	tpy

Attachment B-15
Baseline Actual Emission Calculations for FGDU/SWS (SRU) Flare

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Sour Gas Flow
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	Mscf
Date	[1]	[2]	[1]	[1]	[1]	[1]	[1]	[3]	[4]	[1]	[1]	[4]	[5]
Jan-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr-08	0	0	0	0	0	0	0	0	0	0	0	0	0
May-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Aug-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Sep-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Nov-08	0	6.20E-02	0	0	0	0	0	6.20E-04	1.20E-02	0	0	1.20E-02	1.05
Dec-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Jan-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-09	0	0.20	0	0	0	0	0	2.01E-03	4.10E-02	0	0	4.10E-02	3.59
Apr-09	0	0	0	0	0	0	0	0	0	0	0	0	0
May-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul-09	0	0.17	0	0	0	0	0	1.65E-03	3.19E-02	0	0	3.19E-02	2.80
Aug-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Sep-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Nov-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Jan-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr-10	0	0	0	0	0	0	0	0	0	0	0	0	0
May-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Aug-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Sep-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Nov-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Jan-11	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb-11	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-11	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr-11	0	0	0	0	0	0	0	0	0	0	0	0	0
May-11	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun-11	0	0	0	0	0	0	0	0	0	0	0	0	0

Attachment B-15
Baseline Actual Emission Calculations for FGDU/SWS (SRU) Flare

Date	NO_X tons [1]	SO_2 tons [2]	CO tons [1]	PM tons [1]	PM_{10} tons [1]	$PM_{2.5}$ tons [1]	VOC tons [1]	H_2SO_4 tons [3]	CO_2 tons [4]	CH_4 tons [1]	N_2O tons [1]	GHG tons CO_2e [4]	Sour Gas Flow Mscf [5]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--
Baseline Actual Emissions:	0.00	0.21	0.00	0.00	0.00	0.00	0.00	8.25E-04	1.60E-02	0.00	0.00	1.60E-02	--
Monthly Maximum Throughput During Baseline:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.59
Occurs:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mar-09

Emission Factor References

[1] No emissions of this pollutant from the FGDU/SWS Flare.
[2] Non-routine emission events on 11/8/08, 3/4/09, 7/28/09.
[3] Assumed to be 1% of total SO2 emissions consistent with TRI reporting.
[4] Calculated as follows: CO2 (tons) = (Sour Gas Flow) * 44 / (849.5 scf/kg-mol) * 0.20 * 2.2 lb/kg / 2000 lb/ton per Equation Y-12 of 40 CFR 98.
CO2e (tons) = CO2 (tons) + 21 * CH4 (tons) + 310 * N2O (tons)
[5] Measured throughput rates.

Attachment B-16
Projected Actual Emission Calculations for FGDU/SWS (SRU) Flare

Quantity	Value	Units	Reference
Projected Sour Gas Rate:	15.9	Mscf/hr	Engineering estimate, based on 2002 flaring event
Hours of Operation:	22.2	hr/yr	Engineering estimate (two times larger than 2002 event)

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	0	--	0	0	--
SO_2	87.26	lb/Mscf sour gas	1,387	15.40	Based on 2002 flaring event
CO	0	--	0	0	--
PM	0	--	0	0	--
PM_{10}	0	--	0	0	--
$PM_{2.5}$	0	--	0	0	--
VOC	0	--	0	0	--
H_2SO_4	0.87	lb/Mscf sour gas	13.87	0.15	TRI calculation (1% of SO2 emissions)
CO_2 [3]	22.79	lb/Mscf sour gas	362	4.02	40 CFR 98 Subpart Y
CH_4	0	--	0	0	--
N_2O	0	--	0	0	--
CO_2e [4]	22.79	lb/Mscf sour gas	362	4.02	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/Mscf) x Projected Sour Gas Rate (Mscf/hr) or
[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
[3] Emission Factor = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg per Equation C-5 of 40 CFR 98
[4] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-16
Projected Actual Emission Calculations for FGDU/SWS (SRU) Flare

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.02	Attachment B-15
B. Capable of Accommodating	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.07	See below.
C. Projected Emissions	0.00	15.40	0.00	0.00	0.00	0.00	0.00	0.15	4.02	
D. Demand Growth (D=B-A)	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.06	
E. Projected Actual Emissions (E=C-D)	0.00	15.25	0.00	0.00	0.00	0.00	0.00	0.15	3.97	
F. Emission Increase (F=E-A)	0.00	15.03	0.00	0.00	0.00	0.00	0.00	0.15	3.95	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	N/A	--	N/A	N/A	N/A	N/A	N/A	--	--	
Month that this occurred:	N/A	--	N/A	N/A	N/A	N/A	N/A	--	--	
Throughput that Unit was Capable of Accommodating (Units/year)	N/A	--	N/A	N/A	N/A	N/A	N/A	--	--	
	N/A		N/A	N/A	N/A	N/A	N/A			
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	N/A	--	N/A	N/A	N/A	N/A	N/A	--	--	
	N/A		N/A	N/A	N/A	N/A	N/A			
Units	N/A	--	N/A	N/A	N/A	N/A	N/A	--	--	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	0	0.37	0	0	0	0	0	0.00	0.07	See below.

Calendar year 2009 is used to represent the emissions the unit was capable of accommodating during the baseline period.

Attachment B-17
Baseline Actual Emission Calculations for Gasoline Hydrotreater (GHT) Unit F-701

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Gasoline	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Feb-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Mar-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Apr-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
May-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Jun-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Jul-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Aug-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Sep-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Oct-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Nov-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Dec-08	0.12	0.01	0.13	0.01	0.01	0.01	0.01	0.00	163	0.01	0.00	163	1.77	3,171	3.91
Jan-09	0.12	0.01	0.13	0.01	0.01	0.01	0.01	0.00	174	0.01	0.00	175	3.52	3,257	3.82
Feb-09	0.06	0.00	0.07	0.01	0.01	0.01	0.00	0.00	88	0.01	0.00	89	4.09	1,726	2.20
Mar-09	0.06	0.01	0.06	0.01	0.01	0.01	0.00	0.00	78	0.00	0.00	79	4.41	1,492	2.24
Apr-09	0.09	0.01	0.09	0.01	0.01	0.01	0.01	0.00	113	0.01	0.00	114	6.18	2,304	3.09
May-09	0.08	0.01	0.09	0.01	0.01	0.01	0.01	0.00	111	0.01	0.00	111	6.95	2,241	2.98
Jun-09	0.09	0.01	0.10	0.01	0.01	0.01	0.01	0.00	114	0.01	0.00	115	6.65	2,408	3.27
Jul-09	0.08	0.01	0.09	0.01	0.01	0.01	0.01	0.00	114	0.01	0.00	115	5.88	2,244	3.20
Aug-09	0.10	0.01	0.11	0.01	0.01	0.01	0.01	0.00	130	0.01	0.00	131	6.32	2,635	3.42
Sep-09	0.07	0.01	0.08	0.01	0.01	0.01	0.01	0.00	97	0.01	0.00	98	4.95	1,950	2.52
Oct-09	0.10	0.01	0.11	0.01	0.01	0.01	0.01	0.00	133	0.01	0.00	134	4.77	2,628	3.41
Nov-09	0.08	0.01	0.09	0.01	0.01	0.01	0.01	0.00	111	0.01	0.00	112	3.92	2,270	3.03
Dec-09	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	73	0.00	0.00	74	1.54	1,316	1.50
Jan-10	0.10	0.01	0.11	0.01	0.01	0.01	0.01	0.00	124	0.01	0.00	124	3.37	2,587	3.03
Feb-10	0.09	0.01	0.10	0.01	0.01	0.01	0.01	0.00	111	0.01	0.00	112	4.20	2,309	3.11
Mar-10	0.06	0.00	0.07	0.01	0.01	0.01	0.00	0.00	98	0.01	0.00	99	3.12	1,682	1.74
Apr-10	0.13	0.01	0.14	0.01	0.01	0.01	0.01	0.00	193	0.01	0.00	194	4.96	3,392	3.40
May-10	0.12	0.01	0.13	0.01	0.01	0.01	0.01	0.00	153	0.01	0.00	154	6.12	3,127	4.09
Jun-10	0.12	0.02	0.14	0.01	0.01	0.01	0.01	0.00	164	0.01	0.00	165	6.84	3,352	4.36
Jul-10	0.12	0.02	0.14	0.01	0.01	0.01	0.01	0.00	158	0.01	0.00	159	6.51	3,322	4.52
Aug-10	0.13	0.02	0.14	0.01	0.01	0.01	0.01	0.00	167	0.01	0.00	168	6.31	3,422	4.51
Sep-10	0.10	0.01	0.11	0.01	0.01	0.01	0.01	0.00	136	0.01	0.00	137	5.26	2,786	3.66
Oct-10	0.12	0.01	0.14	0.01	0.01	0.01	0.01	0.00	175	0.01	0.00	176	5.43	3,361	4.03
Nov-10	0.17	0.01	0.19	0.02	0.02	0.02	0.01	0.00	259	0.02	0.00	260	6.27	4,615	5.04
Dec-10	0.13	0.01	0.14	0.01	0.01	0.01	0.01	0.00	170	0.01	0.00	171	4.68	3,490	4.59
Jan-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6	0.00	0.00	6	0.00	110	0.13
Feb-11	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	35	0.00	0.00	35	0.59	710	0.92
Mar-11	0.15	0.02	0.16	0.01	0.01	0.01	0.01	0.00	203	0.01	0.00	204	5.42	3,965	4.98
Apr-11	0.15	0.02	0.17	0.02	0.02	0.02	0.01	0.00	210	0.01	0.00	211	6.46	4,138	5.20
May-11	0.16	0.02	0.18	0.02	0.02	0.02	0.01	0.00	217	0.01	0.00	218	6.96	4,422	5.82
Jun-11	0.16	0.02	0.17	0.02	0.02	0.02	0.01	0.00	215	0.01	0.00	216	7.26	4,216	5.18

Attachment B-17
Baseline Actual Emission Calculations for Gasoline Hydrotreater (GHT) Unit F-701

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Gasoline	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	1.18	0.06	0.88	0.08	0.08	0.08	0.04	0.00	1,675	0.11	0.02	1,684	--	--	--
Monthly Maximum Throughput During Baseline:	4,615	3.91	3,392	3,392	3,392	3,392	3,257	5.82	5.82	5.82	5.82	5.82	6.95	4,615	5.20
Occurs:	Nov-10	Dec-08	Apr-10	Apr-10	Apr-10	Apr-10	Jan-09	May-11	May-11	May-11	May-11	May-11	May-09	Nov-10	Apr-11

Emission Factor References

[1] 4/1/09 stack test results (0.074 lb/MMBtu).
[2] Calculated as follows: SO2 (tons) = Monthly average fuel gas H2S contents (ppmv) * 10^6 / 385.34 ft3/lb-mol * 64 lb/lb-mol * MMscf / 2000 lb/ton.
[3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.
[4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
[5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
[6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
[7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.
[8] Assumed to be 1.5% of total SO2 emissions consistent with TRI reporting.
[9] Calculated as follows: CO2 (tons) = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg * 10^6 scf/MMscf * MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.
CH4 (tons) = 0.003 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
N2O (tons) = 0.0006 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
CO2e (tons) = CO2 (tons) + 21 * CH4 (tons) + 310 * N2O (tons) per Table A-1 of 40 CFR 98.
[10] Measured throughput rates.

Attachment B-18
Projected Actual Emission Calculations for Gasoline Hydrotreater (GHT) Unit F-701

Quantity	Value	Units	Reference
Projected Firing Rate:	6.55	Mscf/hr	Calculated
	7.20	MMBtu/hr	Engineering estimate
Fuel HHV:	1098.55	Btu/scf	Engineering estimate
Fuel H_2S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	0.074	lb/MMBtu	0.53	2.33	4/1/09 Stack Test Results
SO_2	8.31	lb/MMscf	5.44E-02	0.24	Calculated
CO	8.24E-02	lb/MMBtu	0.59	2.60	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	5.36E-02	0.23	AP-42 Table 1.4-2
PM_{10}	7.45E-03	lb/MMBtu	5.36E-02	0.23	AP-42 Table 1.4-2
$PM_{2.5}$	7.45E-03	lb/MMBtu	5.36E-02	0.23	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	3.88E-02	0.17	AP-42 Table 1.4-2
H_2SO_4	0.12	lb/MMscf	8.17E-04	3.58E-03	TRI calculation (1.5% of SO2 emissions)
CO_2 [3]	143,822.95	lb/MMscf	942.63	4,128.72	40 CFR 98 Subpart C
CH_4 [4]	7.27	lb/MMscf	4.76E-02	0.21	40 CFR 98 Subpart C
N_2O [5]	1.45	lb/MMscf	9.52E-03	4.17E-02	40 CFR 98 Subpart C
CO_2e [6]	144,426.00	lb/MMscf	946.58	4,146.03	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf
[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
[3] Emission Factor = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg per Equation C-5 of 40 CFR 98
[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-18
Projected Actual Emission Calculations for Gasoline Hydrotreater (GHT) Unit F-701

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	1.18	0.06	0.88	0.08	0.08	0.08	0.04	0.00	1,684	Attachment B-11
B. Capable of Accommodating	2.04	0.19	1.67	0.15	0.15	0.15	0.10	4.18E-03	3,829	See below.
C. Projected Emissions	2.33	0.24	2.60	0.23	0.23	0.23	0.17	0.00	4,146	
D. Demand Growth (D=B-A)	0.86	0.12	0.79	0.07	0.07	0.07	0.06	0.00	2,145	
E. Projected Actual Emissions (E=C-D)	1.47	0.12	1.81	0.16	0.16	0.16	0.11	0.00	2,001	
F. Emission Increase (F=E-A)	0.30	0.05	0.93	0.08	0.08	0.08	0.07	0.00	317	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	4,615	3.91	3,392	3,392	3,392	3,392	3,257	5.82	5.82	
Month that this occurred:	Nov-10	Dec-08	Apr-10	Apr-10	Apr-10	Apr-10	Jan-09	May-11	May-11	
Throughput that Unit was Capable of Accommodating (Units/year)	55,024	45.17	40,448	40,448	40,448	40,448	37,584	67.10	67.10	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.074	8.31	0.0824	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	2.04	0.19	1.67	0.15	0.15	0.15	0.10	0.00	3,829	

Attachment B-19
Baseline Actual Emission Calculations for Ultraformer Compressors (K1s)

Date	NO_X tons [1]	SO_2 tons [2]	CO tons [3]	PM tons [4]	PM_{10} tons [5]	$PM_{2.5}$ tons [6]	VOC tons [7]	H_2SO_4 tons [8]	CO_2 tons [9]	CH_4 tons [9]	N_2O tons [9]	GHG tons CO_2e [9]	UFU MBPD [10]	Firing MMscf [10]	Operation Hours [10]
Jan-08	1.33	8.13E-04	0.44	0.03	0.03	0.03	0.04	0	160	9.12E-03	1.82E-03	161	9.99	2.62	1,480
Feb-08	1.25	7.64E-04	0.42	0.03	0.03	0.03	0.04	0	151	8.58E-03	1.72E-03	152	9.31	2.47	1,392
Mar-08	1.33	8.12E-04	0.44	0.03	0.03	0.03	0.04	0	160	9.11E-03	1.82E-03	161	10.32	2.62	1,478
Apr-08	1.30	7.91E-04	0.43	0.03	0.03	0.03	0.04	0	156	8.88E-03	1.78E-03	157	10.23	2.55	1,440
May-08	1.34	8.17E-04	0.45	0.03	0.03	0.03	0.04	0	161	9.17E-03	1.83E-03	162	10.29	2.64	1,488
Jun-08	1.28	7.83E-04	0.43	0.03	0.03	0.03	0.04	0	154	8.79E-03	1.76E-03	155	9.65	2.53	1,426
Jul-08	1.34	8.15E-04	0.45	0.03	0.03	0.03	0.04	0	161	9.15E-03	1.83E-03	162	9.92	2.63	1,484
Aug-08	1.30	7.90E-04	0.43	0.03	0.03	0.03	0.04	0	156	8.87E-03	1.77E-03	157	9.55	2.55	1,439
Sep-08	1.28	7.83E-04	0.43	0.03	0.03	0.03	0.04	0	154	8.78E-03	1.76E-03	155	9.17	2.53	1,425
Oct-08	1.32	8.06E-04	0.44	0.03	0.03	0.03	0.04	0	159	9.05E-03	1.81E-03	160	8.24	2.60	1,468
Nov-08	1.25	7.65E-04	0.42	0.03	0.03	0.03	0.04	0	151	8.59E-03	1.72E-03	152	7.81	2.47	1,393
Dec-08	1.34	8.17E-04	0.45	0.03	0.03	0.03	0.04	0	161	9.17E-03	1.83E-03	162	7.59	2.64	1,488
Jan-09	1.32	8.12E-04	0.44	0.03	0.03	0.03	0.04	0	159	9.11E-03	1.82E-03	160	7.90	2.65	1,471
Feb-09	1.13	6.92E-04	0.38	0.02	0.02	0.02	0.03	0	136	7.77E-03	1.55E-03	136	8.42	2.26	1,254
Mar-09	1.33	8.17E-04	0.44	0.03	0.03	0.03	0.04	0	160	9.17E-03	1.83E-03	161	10.06	2.67	1,481
Apr-09	1.30	7.95E-04	0.43	0.03	0.03	0.03	0.04	0	156	8.92E-03	1.78E-03	157	9.59	2.60	1,440
May-09	1.34	8.21E-04	0.45	0.03	0.03	0.03	0.04	0	161	9.22E-03	1.84E-03	162	10.16	2.68	1,488
Jun-09	1.30	7.95E-04	0.43	0.03	0.03	0.03	0.04	0	156	8.92E-03	1.78E-03	157	10.31	2.60	1,440
Jul-09	1.34	8.21E-04	0.45	0.03	0.03	0.03	0.04	0	161	9.22E-03	1.84E-03	162	10.44	2.68	1,488
Aug-09	1.33	8.19E-04	0.44	0.03	0.03	0.03	0.04	0	161	9.19E-03	1.84E-03	161	9.52	2.67	1,483
Sep-09	1.30	7.95E-04	0.43	0.03	0.03	0.03	0.04	0	156	8.92E-03	1.78E-03	157	9.95	2.60	1,440
Oct-09	1.22	7.51E-04	0.41	0.02	0.02	0.02	0.04	0	147	8.43E-03	1.69E-03	148	9.09	2.45	1,361
Nov-09	1.28	7.85E-04	0.43	0.03	0.03	0.03	0.04	0	154	8.82E-03	1.76E-03	155	9.48	2.57	1,423
Dec-09	0.97	5.94E-04	0.32	0.02	0.02	0.02	0.03	0	117	6.67E-03	1.33E-03	117	5.65	1.94	1,077
Jan-10	1.32	9.71E-04	0.44	0.03	0.03	0.03	0.05	0	190	1.09E-02	2.18E-03	191	9.70	3.18	1,472
Feb-10	1.21	8.87E-04	0.40	0.03	0.03	0.03	0.04	0	174	9.95E-03	1.99E-03	175	9.98	2.90	1,344
Mar-10	0.24	1.73E-04	0.08	0.01	0.01	0.01	0.01	0	34	1.94E-03	3.88E-04	34	1.25	0.57	262
Apr-10	1.01	7.41E-04	0.34	0.02	0.02	0.02	0.04	0	145	8.32E-03	1.66E-03	146	7.05	2.43	1,124
May-10	1.32	9.70E-04	0.44	0.03	0.03	0.03	0.05	0	190	1.09E-02	2.18E-03	191	10.74	3.17	1,470
Jun-10	1.29	9.48E-04	0.43	0.03	0.03	0.03	0.05	0	186	1.06E-02	2.13E-03	187	10.39	3.10	1,437
Jul-10	1.32	9.68E-04	0.44	0.03	0.03	0.03	0.05	0	190	1.09E-02	2.17E-03	191	10.75	3.17	1,467
Aug-10	1.34	9.80E-04	0.45	0.03	0.03	0.03	0.05	0	192	1.10E-02	2.20E-03	193	10.87	3.21	1,486
Sep-10	1.15	8.43E-04	0.38	0.03	0.03	0.03	0.04	0	165	9.46E-03	1.89E-03	166	10.57	2.76	1,278
Oct-10	1.30	9.53E-04	0.43	0.03	0.03	0.03	0.05	0	187	1.07E-02	2.14E-03	188	10.09	3.12	1,444
Nov-10	1.10	8.05E-04	0.37	0.03	0.03	0.03	0.04	0	158	9.03E-03	1.81E-03	159	7.84	2.63	1,220
Dec-10	1.34	9.82E-04	0.45	0.03	0.03	0.03	0.05	0	192	1.10E-02	2.20E-03	193	10.24	3.21	1,488
Jan-11	1.29	8.62E-04	0.43	0.03	0.03	0.03	0.04	0	169	9.68E-03	1.94E-03	170	9.00	2.82	1,431
Feb-11	1.20	8.00E-04	0.40	0.03	0.03	0.03	0.04	0	157	8.98E-03	1.80E-03	158	9.46	2.62	1,328
Mar-11	1.31	8.74E-04	0.44	0.03	0.03	0.03	0.04	0	172	9.81E-03	1.96E-03	172	10.11	2.86	1,451
Apr-11	1.29	8.61E-04	0.43	0.03	0.03	0.03	0.04	0	169	9.67E-03	1.93E-03	170	9.98	2.82	1,430
May-11	1.33	8.91E-04	0.44	0.03	0.03	0.03	0.04	0	175	1.00E-02	2.00E-03	176	9.85	2.92	1,479
Jun-11	1.18	7.93E-04	0.39	0.03	0.03	0.03	0.04	0	156	8.90E-03	1.78E-03	156	9.25	2.60	1,316

Attachment B-19
Baseline Actual Emission Calculations for Ultraformer Compressors (K1s)

Date	NO_X tons [1]	SO_2 tons [2]	CO tons [3]	PM tons [4]	PM_{10} tons [5]	$PM_{2.5}$ tons [6]	VOC tons [7]	H_2SO_4 tons [8]	CO_2 tons [9]	CH_4 tons [9]	N_2O tons [9]	GHG tons CO_2e [9]	UFU MBPD [10]	Firing MMscf [10]	Operation Hours [10]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	14.55	0.01	4.90	0.31	0.31	0.31	0.47	0	1,948	0.11	0.02	1,957	--	--	--
Monthly Maximum Throughput During Baseline:	1,488	3.18	1,488	3.18	3.18	3.18	2.68	3.21	3.21	3.21	3.21	3.21	10.87	3.21	1,488
Occurs:	May-08	Jan-10	May-08	Jan-10	Jan-10	Jan-10	May-09	Dec-10	Dec-10	Dec-10	Dec-10	Dec-10	Aug-10	Dec-10	May-08

Emission Factor References

[1] 12/9/93 stack test results (1.8 lb/hr).
[2] Emission factor of 5.88E-04 lb/MMBtu converted to lb/MMscf using the HHV of natural gas per AP-42 Table 3.2-3.
[3] 12/9/93 stack test results (0.6 lb/hr).
[4] Emission factor of 1.941E-02 lb/MMBtu converted to lb/MMscf using the HHV of natural gas per AP-42 Table 3.2-3.
[5] Emission factor of 1.941E-02 lb/MMBtu converted to lb/MMscf using the HHV of natural gas per AP-42 Table 3.2-3.
[6] Emission factor of 1.941E-02 lb/MMBtu converted to lb/MMscf using the HHV of natural gas per AP-42 Table 3.2-3.
[7] Emission factor of 2.96E-02 lb/MMBtu converted to lb/MMscf using the HHV of natural gas per AP-42 Table 3.2-3.
[8] Assumed to be negligible.
[9] Calculated as follows: CO2 (tons) = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg * 10^6 scf/MMscf * MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.
CH4 (tons) = 0.003 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
N2O (tons) = 0.0006 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
CO2e (tons) = CO2 (tons) + 21 * CH4 (tons) + 310 * N2O (tons) per Table A-1 of 40 CFR 98.
[10] Measured throughput rate and hours of operation. Monthly firing rates estimated using annual firing rates and monthly hours of operation.

Attachment B-20
Projected Actual Emission Calculations for Ultraformer Compressors (K1s)

Quantity	Value	Units	Reference
Projected Firing Rate:	4.32	Mscf/hr	Engineering estimate (total firing of 2 compressors)
	4.50	MMBtu/hr	Calculated
Fuel HHV:	1043	Btu/scf	2008-2011 monitoring
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	1.80	lb/hr/compressor	3.60	15.77	12/9/93 Stack Test Results
SO_2	0.61	lb/MMscf	2.65E-03	1.16E-02	AP-42 Table 3.2-3
CO	0.60	lb/hr/compressor	1.20	5.26	12/9/93 Stack Test Results
PM	20.25	lb/MMscf	8.74E-02	0.38	AP-42 Table 3.2-3
PM_{10}	20.25	lb/MMscf	8.74E-02	0.38	AP-42 Table 3.2-3
$PM_{2.5}$	20.25	lb/MMscf	8.74E-02	0.38	AP-42 Table 3.2-3
VOC	30.88	lb/MMscf	0.13	0.58	AP-42 Table 3.2-3
H_2SO_4	0	lb/MMscf	0	0	Negligible
CO_2 [3]	122,000.00	lb/MMscf	526.43	2,305.76	40 CFR 98 Subpart C
CH_4 [4]	6.90	lb/MMscf	2.98E-02	0.13	40 CFR 98 Subpart C
N_2O [5]	1.38	lb/MMscf	5.95E-03	2.61E-02	40 CFR 98 Subpart C
CO_2e [6]	122,572.72	lb/MMscf	528.90	2,316.59	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf
[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
[3] Emission Factor = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg per Equation C-5 of 40 CFR 98
[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98
[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-20
Projected Actual Emission Calculations for Ultraformer Compressors (K1s)

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	14.55	0.01	4.90	0.31	0.31	0.31	0.47	0.00	1,957	Attachment B-11
B. Capable of Accommodating	15.45	0.01	5.15	0.37	0.37	0.37	0.48	0.00	2,270	See below.
C. Projected Emissions	15.77	0.01	5.26	0.38	0.38	0.38	0.58	0.00	2,317	
D. Demand Growth (D=B-A)	0.90	0.00	0.25	0.06	0.06	0.06	0.00	0.00	313	
E. Projected Actual Emissions (E=C-D)	14.87	0.01	5.00	0.32	0.32	0.32	0.58	0.00	2,004	
F. Emission Increase (F=E-A)	0.32	0.00	0.11	0.01	0.01	0.01	0.11	0.00	46	

B. Capable of Accommodating	**NOx**	**SO2**	**CO**	**PM**	**PM10**	**PM2.5**	**VOC**	**H2SO4**	**GHG (CO2e)**	**Notes**
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	1,488	3.18	1,488	3.18	3.18	3.18	2.68	3.21	3.21	
Month that this occurred:	May-08	Jan-10	May-08	Jan-10	Jan-10	Jan-10	May-09	Dec-10	Dec-10	
Throughput that Unit was Capable of Accommodating (Units/year)	17,170	36.65	17,170	36.65	36.65	36.65	30.96	37.04	37.04	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	1.80	0.61	0.60	20.25	20.25	20.25	30.88	0.00	122,573	
Units	Hours	MMscf	Hours	MMscf	MMscf	MMscf	MMscf	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	15.45	0.01	5.15	0.37	0.37	0.37	0.48	0.00	2,270	

Attachment B-21
Baseline Actual Emission Calculations for Cooling Tower UU3

Date	NO_X tons [1]	SO_2 tons [1]	CO tons [1]	PM tons [2]	PM_{10} tons [3]	$PM_{2.5}$ tons [3]	VOC tons [4]	H_2SO_4 tons [1]	CO_2 tons [1]	CH_4 tons [1]	N_2O tons [1]	GHG tons CO_2e [1]	Operating Hours [5]	TDS mg/L [5]	Meas. VOC ppmv [5]
Jan-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Feb-08	0.00	0.00	0.00	1.11	0.51	0.00	5.84	0.00	0.00	0.00	0.00	0	696	3,688	79.70
Mar-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Apr-08	0.00	0.00	0.00	1.15	0.53	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,688	79.70
May-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Jun-08	0.00	0.00	0.00	1.15	0.53	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,688	79.70
Jul-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Aug-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Sep-08	0.00	0.00	0.00	1.15	0.53	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,688	79.70
Oct-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Nov-08	0.00	0.00	0.00	1.15	0.53	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,688	79.70
Dec-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Jan-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Feb-09	0.00	0.00	0.00	1.04	0.48	0.00	5.64	0.00	0.00	0.00	0.00	0	672	3,568	79.70
Mar-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Apr-09	0.00	0.00	0.00	1.11	0.51	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,568	79.70
May-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Jun-09	0.00	0.00	0.00	1.11	0.51	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,568	79.70
Jul-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Aug-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Sep-09	0.00	0.00	0.00	1.11	0.51	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,568	79.70
Oct-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Nov-09	0.00	0.00	0.00	1.11	0.51	0.00	3.42	0.00	0.00	0.00	0.00	0	720	3,568	45.09
Dec-09	0.00	0.00	0.00	1.15	0.53	0.00	3.59	0.00	0.00	0.00	0.00	0	744	3,568	45.81
Jan-10	0.00	0.00	0.00	1.17	0.54	0.00	7.86	0.00	0.00	0.00	0.00	0	744	3,644	100.27
Feb-10	0.00	0.00	0.00	1.06	0.49	0.00	15.06	0.00	0.00	0.00	0.00	0	672	3,644	212.74
Mar-10	0.00	0.00	0.00	1.17	0.54	0.00	4.31	0.00	0.00	0.00	0.00	0	744	3,644	54.96
Apr-10	0.00	0.00	0.00	1.14	0.52	0.00	25.05	0.00	0.00	0.00	0.00	0	720	3,644	330.28
May-10	0.00	0.00	0.00	1.17	0.54	0.00	1.74	0.00	0.00	0.00	0.00	0	744	3,644	22.23
Jun-10	0.00	0.00	0.00	1.14	0.52	0.00	2.59	0.00	0.00	0.00	0.00	0	720	3,644	34.18
Jul-10	0.00	0.00	0.00	1.17	0.54	0.00	14.53	0.00	0.00	0.00	0.00	0	744	3,644	185.44
Aug-10	0.00	0.00	0.00	1.17	0.54	0.00	1.31	0.00	0.00	0.00	0.00	0	744	3,644	16.69
Sep-10	0.00	0.00	0.00	1.14	0.52	0.00	4.47	0.00	0.00	0.00	0.00	0	720	3,644	58.90
Oct-10	0.00	0.00	0.00	1.17	0.54	0.00	2.38	0.00	0.00	0.00	0.00	0	744	3,644	30.38
Nov-10	0.00	0.00	0.00	1.14	0.52	0.00	4.88	0.00	0.00	0.00	0.00	0	720	3,644	64.33
Dec-10	0.00	0.00	0.00	1.17	0.54	0.00	2.57	0.00	0.00	0.00	0.00	0	744	3,644	32.75
Jan-11	0.00	0.00	0.00	1.07	0.49	0.00	7.60	0.00	0.00	0.00	0.00	0	744	3,313	96.93
Feb-11	0.00	0.00	0.00	0.96	0.44	0.00	10.64	0.00	0.00	0.00	0.00	0	672	3,313	150.35
Mar-11	0.00	0.00	0.00	1.07	0.49	0.00	8.45	0.00	0.00	0.00	0.00	0	744	3,313	107.87
Apr-11	0.00	0.00	0.00	1.03	0.47	0.00	0.27	0.00	0.00	0.00	0.00	0	720	3,313	3.54
May-11	0.00	0.00	0.00	1.07	0.49	0.00	0.01	0.00	0.00	0.00	0.00	0	744	3,313	0.19
Jun-11	0.00	0.00	0.00	1.03	0.47	0.00	0.09	0.00	0.00	0.00	0.00	0	720	3,313	1.22

Attachment B-21
Baseline Actual Emission Calculations for Cooling Tower UU3

Date	NO_X tons [1]	SO_2 tons [1]	CO tons [1]	PM tons [2]	PM_{10} tons [3]	$PM_{2.5}$ tons [3]	VOC tons [4]	H_2SO_4 tons [1]	CO_2 tons [1]	CH_4 tons [1]	N_2O tons [1]	GHG tons CO_2e [1]	Operating Hours [5]	TDS mg/L [5]	Meas. VOC ppmv [5]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	0.00	0.00	0.00	13.72	6.29	0.03	71.00	0.00	0	0.00	0.00	0	--	--	--
Monthly Maximum Throughput During Baseline:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	744.00	3,688	330.28
Occurs:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Jan-08	Jan-08	Apr-10

Emission Factor References

[1] No emissions of NOx, SO2, CO, H2SO4, CO2, CH4, or N2O from the cooling tower.

[2] Calculated as follows: (34,588 gal/min circulation rate) * 0.02% drift * 8.34 lb/gal * TDS (ppm) / 10^6 * 60 min/hr * hr/mo / 2000 lb/ton

[3] Fraction of total PM that is PM10 is 45.89%, and PM2.5 is 0.20% based on Reisman and Frisbie, Calculating Realistic PM10 Emissions from Cooling Towers, Proceedings of 2001 A&WMA ACE.

[4] Calculated as follows: (34,588 gal/min circulation rate) * 8.34 lb/gal * C (ppmw) / 10^6 * 60 min/hr * hr/mo / 2000 lb/ton

$$C = \frac{M \times (P \times 0.03342 \frac{atm}{inHg}) \times b \times c}{R \times (T + 273) \times a}$$

C = Concentration of air strippable compound in the water matrix, part-per-million by weight (ppmw).
M = Molecular weight of the compound, 16.05 g/mol for methane.
P = Pressure in the stripping chamber, 29.92 in Hg (assumed to be the same as atmospheric pressure).
b = Stripping air flow rate, 2500 ml/min.
c = Concentration of compound in the stripped air, ppmv as CH4, from the FID analyzer.
R = Ideal gas constant, 82.054 ml-atm/mol-K
T = Stripping chamber temperature, 48 C.
a = Sample water flow rate, 125 ml/min.

[5] Measured throughput rates. No downtime for cooling tower. TDS value based on measured conductivity (assuming TDS = conductivity) average for each calendar year. Measured VOC data is concentration in the stripped air as measured by an FID analyzer (Method 21).

Attachment B-22
Projected Actual Emission Calculations for Cooling Tower UU3

Quantity	Value	Units	Reference
Projected TDS:	3688	mg/L	Engineering estimate
Projected VOC:	6.20	ppmv, air	Leak threshold under 40 CFR 63 Subpart CC, 245 days/year
	62	ppmv, air	Delay of repair threshold under 40 CFR 63 Subpart CC, 120 days/year
	24.55	ppmv, air	Annual average
Circulation Rate:	42229	gpm	Design rate
Drift:	0.005%		
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	0	--	0	0	--
SO_2	0	--	0	0	--
CO	0	--	0	0	--
PM	1.54	lb/MMgal	3.90	17.07	AP-42 Section 13.4
PM_{10} [3]	0.71	lb/MMgal	1.79	7.83	AP-42 Section 13.4
$PM_{2.5}$ [3]	3.08E-03	lb/MMgal	7.79E-03	3.41E-02	AP-42 Section 13.4
VOC [4]	2.49	lb/MMgal	6.31	27.65	EPA Method 21 (El Paso Method)
H_2SO_4	0	--	0	0	--
CO_2	0	--	0	0	--
CH_4	0	--	0	0	--
N_2O	0	--	0	0	--
CO_2e	0	--	0	0	--

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Fraction of total PM that is PM10 is 45.89%, and PM2.5 is 0.20% based on Reisman and Frisbie, Calculating Realistic PM10 Emissions from Cooling Towers, Proceedings of 2001 A&WMA ACE.

[4] Refer to reference [4] shown on Baseline Actual Emission calculations.

Attachment B-22
Projected Actual Emission Calculations for Cooling Tower UU3

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	0.00	0.00	0.00	13.72	6.29	0.03	71.00	0.00	0	Attachment B-21
B. Capable of Accommodating	0.00	0.00	0.00	13.98	6.41	0.03	22.65	0.00	0	See below.
C. Projected Emissions	0.00	0.00	0.00	17.07	7.83	0.03	27.65	0.00	0	
D. Demand Growth (D=B-A)	0.00	0.00	0.00	0.26	0.12	0.00	0.00	0.00	0	
E. Projected Actual Emissions (E=C-D)	0.00	0.00	0.00	16.81	7.71	0.03	27.65	0.00	0	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	3.09	1.42	0.01	0.00	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	N/A N/A	N/A N/A	N/A N/A	--	--	--	--	N/A N/A	N/A N/A	
Month that this occurred:	N/A	N/A	N/A	--	--	--	--	N/A	N/A	
Throughput that Unit was Capable of Accommodating (Units/year)	N/A N/A	N/A N/A	N/A N/A	18,179	18,179	18,179	18,179	N/A N/A	N/A N/A	34,588 gpm x 8,760 hr/yr
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	N/A N/A	N/A N/A	N/A N/A	1.54	0.71	0.00	2.49	N/A N/A	N/A N/A	
Units	N/A	N/A	N/A	MMgal	MMgal	MMgal	MMgal	N/A	N/A	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	0	0	0	13.98	6.41	0.03	22.65	0	0	

Attachment B-23
Baseline Actual Emission Calculations for Cogeneration Unit Turbines

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Turbine Natural Gas		Turbine Fuel Gas		Total	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MMBtu	MMscf	MMBtu	MMscf	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]	[10]	[10]	[10]
Jan-08	6.85	0.04	8.13	0.65	0.65	0.65	0.21	0.00	11,759	0.65	0.13	11,813	152,419	144.66	45,917	40.94	198,336	185.60
Feb-08	6.22	0.05	7.12	0.57	0.57	0.57	0.18	0.00	10,259	0.57	0.11	10,306	125,411	119.03	48,168	49.50	173,579	168.53
Mar-08	6.55	0.06	7.20	0.58	0.58	0.58	0.18	0.00	10,079	0.58	0.12	10,127	128,075	121.56	47,472	55.94	175,547	177.49
Apr-08	5.91	0.05	6.84	0.55	0.55	0.55	0.18	0.00	9,780	0.55	0.11	9,826	118,977	112.92	47,847	47.11	166,824	160.03
May-08	5.60	0.05	6.45	0.52	0.52	0.52	0.17	0.00	9,316	0.52	0.10	9,360	107,758	102.27	49,681	49.31	157,439	151.58
Jun-08	5.63	0.05	6.50	0.52	0.52	0.52	0.17	0.00	9,365	0.52	0.10	9,409	113,152	107.39	45,404	45.06	158,556	152.46
Jul-08	6.30	0.05	7.10	0.57	0.57	0.57	0.18	0.00	10,190	0.57	0.11	10,237	127,375	120.89	45,880	49.70	173,255	170.59
Aug-08	6.44	0.06	7.44	0.60	0.60	0.60	0.19	0.00	10,713	0.60	0.12	10,763	129,278	122.70	52,083	51.69	181,361	174.39
Sep-08	6.82	0.05	7.58	0.61	0.61	0.61	0.19	0.00	10,779	0.61	0.12	10,830	142,030	134.80	42,743	49.83	184,772	184.63
Oct-08	6.61	0.05	7.56	0.61	0.61	0.61	0.19	0.00	10,884	0.61	0.12	10,935	138,488	131.44	45,985	47.68	184,474	179.12
Nov-08	7.23	0.05	8.37	0.67	0.67	0.67	0.21	0.00	12,021	0.67	0.13	12,077	155,695	147.77	48,454	48.09	204,148	195.86
Dec-08	7.07	0.05	8.50	0.68	0.68	0.68	0.22	0.00	12,411	0.68	0.14	12,468	153,242	145.44	54,065	45.94	207,307	191.39
Jan-09	6.63	0.02	7.68	0.62	0.62	0.62	0.20	0.00	10,897	0.62	0.12	10,949	171,463	164.70	15,908	14.81	187,371	179.51
Feb-09	6.31	0.00	7.29	0.59	0.59	0.59	0.19	0.00	10,253	0.59	0.12	10,302	177,789	170.78	0	0.00	177,789	170.78
Mar-09	6.47	0.00	7.48	0.60	0.60	0.60	0.19	0.00	10,519	0.60	0.12	10,569	182,403	175.21	0	0.00	182,403	175.21
Apr-09	6.02	0.02	6.95	0.56	0.56	0.56	0.18	0.00	9,838	0.56	0.11	9,884	152,582	146.57	16,837	16.39	169,419	162.95
May-09	6.36	0.05	7.34	0.59	0.59	0.59	0.19	0.00	10,527	0.59	0.12	10,576	134,910	129.59	44,012	42.69	178,922	172.28
Jun-09	6.19	0.04	7.23	0.58	0.58	0.58	0.19	0.00	10,367	0.58	0.12	10,415	130,910	125.75	45,409	41.77	176,319	167.52
Jul-09	6.53	0.05	7.53	0.61	0.61	0.61	0.19	0.00	10,810	0.61	0.12	10,861	136,345	130.97	47,232	45.82	183,577	176.79
Aug-09	6.82	0.05	7.86	0.63	0.63	0.63	0.20	0.00	11,265	0.63	0.13	11,317	148,081	142.24	43,665	42.36	191,746	184.60
Sep-09	6.61	0.04	7.62	0.61	0.61	0.61	0.20	0.00	10,923	0.61	0.12	10,974	143,806	138.14	42,142	40.88	185,948	179.02
Oct-09	6.31	0.04	7.28	0.59	0.59	0.59	0.19	0.00	10,429	0.59	0.12	10,478	137,162	131.75	40,365	39.15	177,527	170.91
Nov-09	7.25	0.05	8.36	0.67	0.67	0.67	0.21	0.00	11,981	0.67	0.13	12,037	155,848	149.70	47,970	46.53	203,818	196.24
Dec-09	7.51	0.02	8.58	0.69	0.69	0.69	0.22	0.00	12,134	0.69	0.14	12,191	189,557	182.08	19,756	21.22	209,313	203.30
Jan-10	5.89	0.02	6.77	0.55	0.55	0.55	0.17	0.00	9,570	0.55	0.11	9,615	150,324	144.54	14,917	15.01	165,241	159.55
Feb-10	5.01	0.02	5.75	0.46	0.46	0.46	0.15	0.00	8,116	0.46	0.09	8,154	126,470	121.60	13,790	14.17	140,260	135.78
Mar-10	5.97	0.03	6.78	0.55	0.55	0.55	0.17	0.00	9,595	0.55	0.11	9,640	134,275	129.11	31,170	32.51	165,445	161.62
Apr-10	6.84	0.05	8.20	0.66	0.66	0.66	0.21	0.00	11,877	0.66	0.13	11,932	146,978	141.32	53,111	43.82	200,089	185.15
May-10	6.06	0.05	7.03	0.57	0.57	0.57	0.18	0.00	10,087	0.57	0.11	10,134	121,533	116.86	49,883	47.32	171,416	164.18
Jun-10	6.15	0.05	7.22	0.58	0.58	0.58	0.18	0.00	10,391	0.58	0.12	10,439	123,455	118.71	52,578	47.81	176,034	166.51
Jul-10	6.82	0.06	8.11	0.65	0.65	0.65	0.21	0.00	11,747	0.65	0.13	11,801	137,397	132.11	60,397	52.67	197,794	184.78
Aug-10	6.71	0.06	8.04	0.65	0.65	0.65	0.21	0.00	11,691	0.65	0.13	11,745	130,891	125.86	65,181	55.78	196,073	181.64
Sep-10	6.80	0.06	7.93	0.64	0.64	0.64	0.20	0.00	11,423	0.64	0.13	11,475	135,745	130.52	57,675	53.67	193,420	184.20
Oct-10	6.38	0.05	7.53	0.61	0.61	0.61	0.19	0.00	10,887	0.61	0.12	10,937	129,553	124.57	54,052	48.14	183,605	172.71
Nov-10	6.40	0.04	7.66	0.62	0.62	0.62	0.20	0.00	11,087	0.62	0.12	11,138	144,686	139.12	42,080	34.17	186,766	173.29
Dec-10	7.10	0.03	8.33	0.67	0.67	0.67	0.21	0.00	11,927	0.67	0.13	11,983	168,966	162.47	34,266	29.75	203,231	192.21
Jan-11	7.12	0.03	8.25	0.66	0.66	0.66	0.21	0.00	11,757	0.66	0.13	11,812	170,227	163.91	30,882	28.88	201,109	192.79
Feb-11	5.93	0.03	6.93	0.56	0.56	0.56	0.18	0.00	9,938	0.56	0.11	9,984	138,415	133.28	30,709	27.20	169,123	160.48
Mar-11	6.53	0.03	7.57	0.61	0.61	0.61	0.19	0.00	10,789	0.61	0.12	10,839	156,018	150.23	28,610	26.64	184,628	176.88
Apr-11	5.65	0.04	6.47	0.52	0.52	0.52	0.17	0.00	9,275	0.52	0.10	9,318	118,612	114.21	39,243	38.81	157,855	153.03
May-11	6.30	0.06	7.27	0.58	0.58	0.58	0.19	0.00	10,491	0.58	0.12	10,539	115,215	110.89	62,019	59.79	177,234	170.68
Jun-11	5.00	0.04	5.85	0.47	0.47	0.47	0.15	0.00	8,459	0.47	0.09	8,498	96,903	93.27	45,875	42.12	142,778	135.38

Attachment B-23
Baseline Actual Emission Calculations for Cogeneration Unit Turbines

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	Turbine Natural Gas		Turbine Fuel Gas		Total	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MMBtu	MMscf	MMBtu	MMscf	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--	--	--		
Baseline Actual Emissions:	77.54	0.48	89.39	7.19	7.19	7.19	2.30	0.01	129,278	7.26	1.45	129,880	--	--	--	--		
Monthly Maximum Throughput During Baseline:	203.30	203.30	209,313	209,313	209,313	209,313	209,313	203.30	203.30	203.30	203.30	203.30	189,557	182.08	65,181	55.94	209,313	203.30
Occurs:	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Aug-10	Mar-08	Dec-09	Dec-09

Emission Factor References

[1] Average of 10/20/08, 10/27/08, 10/22/10, 10/26/10 stack test results (73.85 lb/MMscf).
[2] Calculated as follows: SO2 (tons) = Monthly average fuel gas H2S contents (ppmv) * 10^6 / 385.34 ft3/lb-mol * 64 lb/lb-mol * MMscf / 2000 lb/ton.
[3] Emission factor of 0.082 lb/MMBtu per AP-42 Table 3.1-1.
[4] Emission factor of 0.0066 lb/MMBtu per AP-42 Table 3.1-2a.
[5] Emission factor of 0.0066 lb/MMBtu per AP-42 Table 3.1-2a.
[6] Emission factor of 0.0066 lb/MMBtu per AP-42 Table 3.1-2a.
[7] Emission factor of 0.0021 lb/MMBtu per AP-42 Table 3.1-2a.
[8] Assumed to be 1.5% of total SO2 emissions consistent with TRI reporting.
[9] Based on carbon content and molecular weight (calculations on following page).
[10] Based on provided throughput rates.

Attachment B-24
Projected Actual Emission Calculations for Cogeneration Unit Turbines

Quantity	Value	Units	Reference
Projected Nat Gas Firing:	201.01	MMBtu/hr	Engineering estimate
Nat Gas HHV:	1043.3	Btu/scf	2008-2011 monitoring
Projected Fuel Gas Firing:	73.02	MMBtu/hr	Engineering estimate
Fuel Gas HHV:	1094.5	Btu/scf	2008-2011 monitoring
Fuel Gas H_2S Content:	12.86	ppmvd	2011 monitoring
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	73.85	lb/MMscf	19.16	83.90	2008-2010 Stack Test Results
SO_2	0.57	lb/MMscf	3.80E-02	0.17	Calculated
CO	8.20E-02	lb/MMBtu	22.47	98.42	AP-42 Table 3.1-1
PM	6.60E-03	lb/MMBtu	1.81	7.92	AP-42 Table 3.1-2a
PM_{10}	6.60E-03	lb/MMBtu	1.81	7.92	AP-42 Table 3.1-2a
$PM_{2.5}$	6.60E-03	lb/MMBtu	1.81	7.92	AP-42 Table 3.1-2a
VOC	0.0021	lb/MMBtu	0.58	2.52	AP-42 Table 3.1-2a
H_2SO_4	0.01	lb/MMscf	5.70E-04	2.50E-03	TRI calculation (1.5% of SO2 emissions)
CO_2 [3]	129,461.44	lb/MMscf	33,580.03	147,080.52	40 CFR 98 Subpart C
CH_4 [4]	6.99	lb/MMscf	1.81	7.94	40 CFR 98 Subpart C
N_2O [5]	1.40	lb/MMscf	0.36	1.59	40 CFR 98 Subpart C
CO_2e [6]	130,041.65	lb/MMscf	33,730.52	147,739.70	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg per Equation C-5 of 40 CFR 98

[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-24
Projected Actual Emission Calculations for Cogeneration Unit Turbines

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	77.54	0.48	89.39	7.19	7.19	7.19	2.30	0.01	129,880	Attachment B-23
B. Capable of Accommodating	86.62	0.67	99.02	7.97	7.97	7.97	2.54	1.00E-02	152,529	See below.
C. Projected Emissions	83.90	0.17	98.42	7.92	7.92	7.92	2.52	0.00	147,740	
D. Demand Growth (D=B-A)	9.08	0.18	9.63	0.78	0.78	0.78	0.23	0.00	22,649	
E. Projected Actual Emissions (E=C-D)	74.82	0.00	88.79	7.15	7.15	7.15	2.29	0.00	125,091	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	

B. Capable of Accommodating	**NOx**	**SO2**	**CO**	**PM**	**PM10**	**PM2.5**	**VOC**	**H2SO4**	**GHG (CO2e)**	**Notes**
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	203	203	209,313	209,313	209,313	209,313	209,313	203	203	
Month that this occurred:	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	
Throughput that Unit was Capable of Accommodating (Units/year)	2,346	2,346	2,415,205	2,415,205	2,415,205	2,415,205	2,415,205	2,346	2,346	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	73.850	0.57	0.082	6.60E-03	6.60E-03	6.60E-03	2.10E-03	0.01	130,042	
Units	MMscf	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	86.62	0.67	99.02	7.97	7.97	7.97	2.54	0.01	152,529	

Attachment B-25
Baseline Actual Emission Calculations for Cogeneration Unit HRSGs

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	HRSG Fuel Gas	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]
Jan-08	3.44	0.19	2.59	0.23	0.23	0.23	0.17	0.00	2,819	0.21	0.04	2,836	62,907	93.07
Feb-08	3.05	0.16	2.53	0.23	0.23	0.23	0.17	0.00	3,001	0.20	0.04	3,018	61,516	82.57
Mar-08	3.45	0.21	2.45	0.22	0.22	0.22	0.16	0.00	2,654	0.20	0.04	2,671	59,617	93.40
Apr-08	3.40	0.28	2.50	0.23	0.23	0.23	0.16	0.00	2,649	0.20	0.04	2,665	60,642	92.10
May-08	4.76	0.39	3.54	0.32	0.32	0.32	0.23	0.01	3,818	0.28	0.06	3,841	86,071	129.00
Jun-08	5.86	0.93	5.23	0.47	0.47	0.47	0.34	0.01	6,504	0.42	0.08	6,539	*127,081*	*158.63*
Jul-08	5.54	0.92	4.56	0.41	0.41	0.41	0.30	0.01	5,395	0.37	0.07	5,425	*110,856*	*150.16*
Aug-08	4.93	0.47	3.68	0.33	0.33	0.33	0.24	0.01	4,062	0.30	0.06	4,086	89,466	133.44
Sep-08	3.21	0.25	2.40	0.22	0.22	0.22	0.16	0.00	2,635	0.19	0.04	2,651	58,194	86.89
Oct-08	3.55	0.23	2.87	0.26	0.26	0.26	0.19	0.00	3,365	0.23	0.05	3,384	69,590	96.11
Nov-08	3.38	0.17	2.89	0.26	0.26	0.26	0.19	0.00	3,498	0.23	0.05	3,517	70,132	91.43
Dec-08	3.61	0.18	3.26	0.30	0.30	0.30	0.21	0.00	4,061	0.26	0.05	4,083	79,258	97.84
Jan-09	4.31	0.30	4.10	0.37	0.37	0.37	0.27	0.00	5,314	0.33	0.07	5,342	99,541	116.62
Feb-09	4.08	0.17	3.57	0.32	0.32	0.32	0.23	0.00	4,428	0.29	0.06	4,451	86,667	110.50
Mar-09	4.67	0.32	3.48	0.31	0.31	0.31	0.23	0.00	4,442	0.28	0.06	4,465	84,466	126.57
Apr-09	4.25	0.36	3.53	0.32	0.32	0.32	0.23	0.01	4,222	0.28	0.06	4,245	85,789	115.05
May-09	4.93	0.41	4.14	0.37	0.37	0.37	0.27	0.01	4,972	0.33	0.07	4,999	100,582	133.62
Jun-09	5.13	0.48	4.21	0.38	0.38	0.38	0.28	0.01	4,850	0.34	0.07	4,878	102,125	138.85
Jul-09	4.98	0.59	3.90	0.35	0.35	0.35	0.26	0.01	4,815	0.33	0.07	4,842	94,780	134.99
Aug-09	5.15	0.60	4.43	0.40	0.40	0.40	0.29	0.01	5,318	0.35	0.07	5,347	107,466	139.53
Sep-09	4.81	0.50	4.15	0.38	0.38	0.38	0.27	0.01	5,011	0.33	0.07	5,039	100,768	130.25
Oct-09	4.01	0.39	3.45	0.31	0.31	0.31	0.23	0.01	4,240	0.28	0.06	4,263	83,726	108.66
Nov-09	2.29	0.20	1.91	0.17	0.17	0.17	0.13	0.00	2,281	0.15	0.03	2,294	46,482	61.97
Dec-09	3.42	0.22	3.34	0.30	0.30	0.30	0.22	0.00	4,501	0.27	0.05	4,523	80,995	92.57
Jan-10	4.23	0.34	4.03	0.36	0.36	0.36	0.26	0.01	4,670	0.30	0.06	4,695	97,795	114.58
Feb-10	3.22	0.37	2.67	0.24	0.24	0.24	0.17	0.01	3,123	0.21	0.04	3,140	64,817	87.19
Mar-10	3.26	0.10	3.50	0.32	0.32	0.32	0.23	0.00	4,965	0.28	0.06	4,988	85,080	88.24
Apr-10	3.23	0.21	3.59	0.33	0.33	0.33	0.24	0.00	4,964	0.29	0.06	4,988	87,291	87.41
May-10	4.00	0.37	3.41	0.31	0.31	0.31	0.22	0.01	4,049	0.27	0.05	4,072	82,816	108.35
Jun-10	3.70	0.37	3.18	0.29	0.29	0.29	0.21	0.01	3,780	0.25	0.05	3,801	77,113	100.24
Jul-10	3.98	0.49	3.26	0.30	0.30	0.30	0.21	0.01	3,761	0.26	0.05	3,782	79,267	107.84
Aug-10	3.48	0.41	2.95	0.27	0.27	0.27	0.19	0.01	3,485	0.24	0.05	3,505	71,555	94.33
Sep-10	3.48	0.28	2.95	0.27	0.27	0.27	0.19	0.00	3,496	0.24	0.05	3,515	71,669	94.15
Oct-10	4.04	0.33	3.76	0.34	0.34	0.34	0.25	0.00	4,759	0.30	0.06	4,784	91,292	109.42
Nov-10	3.68	0.22	3.75	0.34	0.34	0.34	0.25	0.00	5,113	0.30	0.06	5,138	91,186	99.68
Dec-10	3.46	0.24	2.93	0.27	0.27	0.27	0.19	0.00	3,464	0.24	0.05	3,484	71,274	93.82
Jan-11	3.97	0.38	3.72	0.34	0.34	0.34	0.24	0.01	4,743	0.30	0.06	4,768	90,442	107.56
Feb-11	3.29	0.28	2.82	0.25	0.25	0.25	0.18	0.00	3,392	0.23	0.05	3,411	68,395	89.04
Mar-11	3.41	0.31	3.03	0.27	0.27	0.27	0.20	0.00	3,756	0.24	0.05	3,776	73,500	92.25
Apr-11	4.24	0.38	3.76	0.34	0.34	0.34	0.25	0.01	4,636	0.30	0.06	4,661	91,368	114.89
May-11	3.93	0.32	3.33	0.30	0.30	0.30	0.22	0.00	3,968	0.27	0.05	3,990	80,944	106.46
Jun-11	4.64	0.37	4.21	0.38	0.38	0.38	0.28	0.01	5,217	0.34	0.07	5,245	102,176	125.64

Attachment B-25
Baseline Actual Emission Calculations for Cogeneration Unit HRSGs

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	CO_2	CH_4	N_2O	GHG	HRSG Fuel Gas	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO_2e	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]
Baseline Period Ends:	Nov-10	Jan-10	May-10	May-10	May-10	May-10	Dec-09	May-11	May-11	May-11	May-11	May-11	--	--
Baseline Actual Emissions:	47.97	4.53	43.15	3.90	3.90	3.90	2.71	0.06	50,570	3.29	0.66	50,843	--	--
Monthly Maximum Throughput During Baseline:	139.53	139.53	127,081	107,466	107,466	107,466	107,466	134.99	139.53	139.53	139.53	139.53	107,466	139.53
Occurs:	Aug-09	Aug-09	Jun-08	Aug-09	Aug-09	Aug-09	Aug-09	Jul-09	Aug-09	Aug-09	Aug-09	Aug-09	Aug-09	Aug-09

Emission Factor References

[1] Average of 10/20/08, 10/27/08, 10/22/10, 10/26/10 stack test results (73.85 lb/MMscf).
[2] Calculated as follows: SO2 (tons) = Monthly average fuel gas H2S contents (ppmv) * 10^6 / 385.34 ft3/lb-mol * 64 lb/lb-mol * MMscf / 2000 lb/ton.
[3] Emission factor of 84 lb/MMscf per AP-42 Table 1.4-2.
[4] Emission factor of 7.6 lb/MMscf per AP-42 Table 1.4-2.
[5] Emission factor of 7.6 lb/MMscf per AP-42 Table 1.4-2.
[6] Emission factor of 7.6 lb/MMscf per AP-42 Table 1.4-2.
[7] Emission factor of 5.5 lb/MMscf per AP-42 Table 1.4-2 for HRSG fuel gas; Emission factor of 0.0021 lb/MMBtu per AP-42 Table 3.1-2a for Turbine.
[8] Assumed to be 1.5% of total SO2 emissions consistent with TRI reporting.
[9] Calculated as follows: CO2 (tons) = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg * 10^6 scf/MMscf * MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.
CH4 (tons) = 0.003 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
N2O (tons) = 0.0006 * HHV * 2.2 lb/kg * MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.
CO2e (tons) = CO2 (tons) + 21 * CH4 (tons) + 310 * N2O (tons) per Table A-1 of 40 CFR 98.
[10] Based on provided throughput rates. Rates for June 2008 and July 2008 are not considered in the monthly maximum throughput rates due to atypical firing rates.

Attachment B-26
Projected Actual Emission Calculations for Cogeneration Unit HRSGs

Quantity	Value	Units	Reference
Projected Firing Rate:	136.54	Mscf/hr	Calculated
	149.99	MMBtu/hr	Engineering estimate
Fuel HHV:	1098.55	Btu/scf	Engineering estimate
Fuel H_2S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

HRSG Fuel Gas

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	73.85	lb/MMscf	10.08	44.16	2008-2010 Stack Test Results
SO_2	8.31	lb/MMscf	1.13	4.97	Calculated
CO	8.24E-02	lb/MMBtu	12.35	54.10	AP-42 Table 1.4-2
PM	7.45E-03	lb/MMBtu	1.12	4.89	AP-42 Table 1.4-2
PM_{10}	7.45E-03	lb/MMBtu	1.12	4.89	AP-42 Table 1.4-2
$PM_{2.5}$	7.45E-03	lb/MMBtu	1.12	4.89	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	0.81	3.54	AP-42 Table 1.4-2
H_2SO_4	0.12	lb/MMscf	1.70E-02	7.45E-02	TRI calculation (1.5% of SO2 emissions)
CO_2 [3]	143,822.95	lb/MMscf	19,636.90	86,009.62	40 CFR 98 Subpart C
CH_4 [4]	7.27	lb/MMscf	0.99	4.35	40 CFR 98 Subpart C
N_2O [5]	1.45	lb/MMscf	0.20	0.87	40 CFR 98 Subpart C
CO_2e [6]	144,426.00	lb/MMscf	19,719.24	86,370.25	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg per Equation C-5 of 40 CFR 98

[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-26
Projected Actual Emission Calculations for Cogeneration Unit HRSGs

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	47.97	4.53	43.15	3.90	3.90	3.90	2.71	0.06	50,843	Attachment B-25
B. Capable of Accommodating	59.45	6.69	62.39	4.62	4.62	4.62	3.34	9.70E-02	91,871	See below.
C. Projected Emissions	44.16	4.97	54.10	4.89	4.89	4.89	3.54	0.07	86,370	
D. Demand Growth (D=B-A)	11.47	2.15	19.24	0.72	0.72	0.72	0.64	0.03	41,028	
E. Projected Actual Emissions (E=C-D)	32.69	2.82	34.86	4.18	4.18	4.18	2.91	0.04	45,342	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	0.28	0.28	0.28	0.20	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	140	140	127,081	107,466	107,466	107,466	107,466	135	140	
Month that this occurred:	Aug-09	Aug-09	Jun-08	Aug-09	Aug-09	Aug-09	Aug-09	Jul-09	Aug-09	
Throughput that Unit was Capable of Accommodating (Units/year)	1,610	1,610	1,515,231	1,240,014	1,240,014	1,240,014	1,240,014	1,558	1,610	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	73.850	8.31	0.0824	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMscf	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	59.45	6.69	62.39	4.62	4.62	4.62	3.34	0.10	91,871	

The representative monthly throughput during the baseline period excludes Jun-08 and Jul-08 due to higher than typical firing rates.

Attachment B-27
Incremental Emission Calculations for Loading Rack

Liquid Loaded	Loading Type	Thruput mgal/yr	Loads	Saturation Factor	True VP psia	MW lb/lb-mole	Temp		Uncontrolled Release Factor	
							Deg F	Deg R		
RR-40 / DCO	Submerged Loading Normal Service	981		0.6	0.00007	130	74.4	534	0.0001	lbs/mgal
Propane	Bottom Loading Balance Service	2744	220	1	14.0000	44.1	40.4	500	1.000	lb/load
Butane	Bottom Loading Balance Service	5787	463	1	14.0000	58.1	74.4	534	1.000	lb/load
Gasoline	Bottom Loading Balance Service	122594		1	5.8000	66	66.4	526	9.068	lbs/mgal
Distillate	Bottom Loading Balance Service	31810		1	0.0078	130	66.4	526	0.024	lbs/mgal
Jet Kerosene	Bottom Loading Balance Service	46		1	0.0098	130	74.4	534	0.030	lbs/mgal
Total										

Emissions calculated per AP-42 Section 5.2.
Uncontrolled emissions = 12.46 * S * P * M / T * LL, where S = Saturation Factor, P = True VP, M = MW, T = Temp, LL = Loading Loss

Attachment B-27
Incremental Emission Calculations fo

Liquid Loaded	Loading Type	Uncontrolled Loss	Leakage Loss	Fug Loss lb/year	Controlled Release Factor		VRU Loss lb/year	Total Emissions lb/year	Total Emissions ton/yr
RR-40 / DCO	Submerged Loading Normal Service	0	1.000	0.1				0	0.00
Propane	Bottom Loading Balance Service	220	1.000	219.5				220	0.11
Butane	Bottom Loading Balance Service	463	1.000	463.0				463	0.23
Gasoline	Bottom Loading Balance Service	1111664	0.008	8893.3	0.0467	lbs/mgal	5725.1	14618	7.31
Distillate	Bottom Loading Balance Service	764	1.000	764.1				764	0.38
Jet Kerosene	Bottom Loading Balance Service	1	1.000	1.4			0.0	1	0.00
Total								16067	8.03

Emissions calculated per AP-42 Section 5.2.
Uncontrolled emissions = 12.46 * S * P * M / T * LL, wher

Attachment B-28
Emission Increase Calculations for Storage Tanks

Existing Non-Modified Tanks

				HAP Emission Increases (lb/yr)									
Material	Worst-Case Tank No.	Throughput Increase (bbl/yr)	VOC Emission Increase (lb/yr)	1,2,4-Trimethylbenzene	2,2,4-Trimethylpentane	Benzene	Biphenyl	Ethylbenzene	Hexane	Isopropyl benzene	Naphthalene	Toluene	Xylenes
TUF	190	874	0.06	0.00	--	0.00	--	0.00	0.00	0.00	--	0.01	0.01
Distillate fuel oil no. 2	212	2075	1.47	0.03	--	--	0.00	--	--	--	0.00	--	0.10
HCN	242	1081	0.08	0.00	0.00	0.00	--	0.00	0.00	--	0.00	0.00	0.01
LSR Gasoline	307	115.5	0.02	0.00	--	0.00	--	0.00	0.00	0.00	--	0.01	0.01
n-Pentane	321	848.5	0.11	--	--	--	--	--	--	--	--	--	--
Gasoline	324	113.5	0.00	0.00	0.00	0.00	--	0.00	0.00	--	0.00	0.00	0.00
DAN	328	2094	0.14	--	--	0.00	--	--	0.01	--	--	0.00	0.00
Alkylate	331	1657	0.18	--	0.03	--	--	--	--	--	--	0.01	--
Ethanol	503	265355	68.46	--	--	--	--	--	--	--	--	--	--
Total			**70.52**	**0.03**	**0.03**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.03**	**0.13**

The incremental increase in throughput predicted for the Project is applied to the worst-case tank, selected based on the tank which results in the highest working losses. The highest working losses occur for tanks that have the least controls and/or the smallest diameter. The VOC emission increase shown for the existing tanks is based on the working losses for the throughput increase as calculated using TANKS 4.09d.

Tank 188 (New)

				Potential HAP Emissions (lb/yr)									
Material	Tank No.	Potential Throughput (bbl/yr)	Potential VOC Emissions (lb/yr)	1,2,4-Trimethylbenzene	2,2,4-Trimethylpentane	Benzene	Biphenyl	Ethylbenzene	Hexane	Isopropyl benzene	Naphthalene	Toluene	Xylenes
Black wax crude	188	8760000	4249.01	--	--	184.41	--	--	--	--	161.10	331.36	148.71
Normal operations		8760000	3271.61	--	--	141.99	--	--	--	--	124.04	255.14	114.50
Roof landing		N/A	977.4	--	--	42.42	--	--	--	--	37.06	76.22	34.21

Tank 206 (Change in Service)

		Actual HAP Emissions (lb/yr)									
Time Period	VOC Emissions (lb/yr)	1,2,4-Trimethylbenzene	2,2,4-Trimethylpentane	Benzene	Biphenyl	Ethylbenzene	Hexane	Isopropyl benzene	Naphthalene	Toluene	Xylenes
2008	3.12	--	--	0.00	--	--	--	--	0.00	0.00	0.00
2009	4.32	--	--	0.00	--	--	--	--	0.00	0.00	0.00
Baseline Actual Emissions	3.72	--	--	0.00	--	--	--	--	0.00	0.00	0.00
Post-project	454.42	--	--	148.56	--	--	--	--	124.61	265.63	118.17
Increase	450.70	--	--	148.56	--	--	--	--	124.61	265.63	118.17

Attachment B-28
Emission Increase Calculations for Storage Tanks

Tank 291 (Black Wax Crude)

		Actual HAP Emissions (lb/yr)									
Time Period	**VOC Emissions (lb/yr)**	**1,2,4-Trimethylbenzene**	**2,2,4-Trimethylpentane**	**Benzene**	**Biphenyl**	**Ethylbenzene**	**Hexane**	**Isopropyl benzene**	**Naphthalene**	**Toluene**	**Xylenes**
2008	33292.37	--	--	1444.91	--	--	--	--	1262.25	2596.34	1165.17
2009	23658.20	--	--	1026.78	--	--	--	--	896.98	1845.01	827.99
Baseline Actual Emissions	28475.28	--	--	1235.85	--	--	--	--	1079.61	2220.68	996.58
Post-project	28475.28	--	--	1235.85	--	--	--	--	1079.61	2220.68	996.58
Increase	0.00	--	--	0.00	--	--	--	--	0.00	0.00	0.00

Tesoro is proposing an emission limit of 14.24 tons of VOC per year at Tank 291.

	VOC Emissions (lb/yr)	**1,2,4-Trimethylbenzene**	**2,2,4-Trimethylpentane**	**Benzene**	**Biphenyl**	**Ethylbenzene**	**Hexane**	**Isopropyl benzene**	**Naphthalene**	**Toluene**	**Xylenes**
Total	4770.23	0.03	0.03	332.97	0.00	0.00	0.01	0.00	285.71	597.02	267.01

Attachment B-29
Potential Emission Calculations for Process Components

Components (service)	FCCU Count	VRU Count	DDU Count	Crude Count	TGTU Count	COB Count	Benzene NESHAP Count	Black Wax Count	Dewax Count	Emission Factor [1] (kg/hr/source)	Emission Factor [1] (lb/hr/source)	Control Effectiveness [2] (%)	Emissions (lbs/yr)	Emissions (Tons/yr)
Valves (gas)	2	20	15	0	150	20	20	0	30	0.0268	0.059083	96	5,321	2.66
Valves (LL)	5	40	30	0	150	50	100	50	100	0.0109	0.024030	95	5,526	2.76
Valves (HL)	0	0	0	30	0	0	0	0	20	0.00023	0.000507	0	222	0.11
Flanges (gas)	0	50	40	0	200	40	20	0	40	0.00025	0.00055	81	358	0.18
Flanges (LL)	15	100	75	0	200	50	200	100	200	0.00025	0.00055	81	862	0.43
Flanges (HL)	0	0	0	80	0	0	0	0	0	0.00025	0.00055	81	73	0.04
Pump Seals (LL)	0	0	2	0	0	0	10	0	0	0.114	0.25	88	3,170	1.59
Pump Seals LL (Tandem)	0	5	0	0	6	0	0	24	0	0.114	0.25	100	-	-
Pump Seal (HL)	0	0	0	3	0	0	0	0	0	0.021	0.046	0	1,217	0.61
Comp. Seals (gas)	0	0	0	0	0	0	0	0	0	0.636	1.4	100	-	-
Comp. Seals (H_2)	0	0	0	0	0	0	0	0	0	0.636	1.402	100	-	-
Process Drains (total)	5	10	10	10	5	5	5	10	50	0.073	0.161	100	-	-
Relief Valves (gas)	0	0	0	0	0	10	5	0	30	0.16	0.35	100	-	-
Total													16,749	8.37

Gas = material in a gaseous state at operating conditions
LL = light liquid = material in a liquid state in which the sum of the concentration of individual constituents with a vapor pressure over 0.3 kilopascals (kPa) at 20 oC is greater than or equal to 20 wt%.
HL = heavy liquid = not in gas/vapor service or light liquid service.

Notes:
[1] Protocol for Equipment Leak Emission Estimates, November 1995, Table 2-2. Refinery Average Emission Factors.
[2] Protocol for Equipment Leak Emission Estimates, November 1995, Table 5-3. Control Effectiveness for an LDAR Program at a Refinery Process Unit.
Monitored under the Consent Decree leak definition of 500 pppm, quarterly with no chance for skip monitoring. Equivalent to HON regulation.

Attachment B-30
Potential Emission Calculations for DDU Reactor (Venting to South Flare)

Quantity	Value	Units	Reference
Reactor characteristics:	2000	ft3	Design information
	1563	psia	Design information
	264.9	degrees F	Design information
	292,005	scf	Calculated
H2S Content:	2,700	ppm	Engineering estimate (plant H2 gas)
Fuel LHV:	480.8	Btu/scf	Engineering estimate (plant H2 gas)
Hours of Operation:	1	hr/yr	Assumes all gas vented in 1 hour, 1 event/year

Pollutant	Emission Factor	Units	Potential Emissions (lb/hr) [1]	Potential Emissions (tpy) [2]	Emission Factor Reference
NO_X	6.80E-02	lb/MMBtu	9.55	4.77E-03	AP-42 Table 13.5-1
SO_2	448.51	lb/MMscf	130.97	6.55E-02	Calculated
CO	0.37	lb/MMBtu	51.95	2.60E-02	AP-42 Table 13.5-1
PM	7.45E-03	lb/MMBtu	1.05	5.23E-04	AP-42 Table 1.4-2
PM_{10}	7.45E-03	lb/MMBtu	1.05	5.23E-04	AP-42 Table 1.4-2
$PM_{2.5}$	7.45E-03	lb/MMBtu	1.05	5.23E-04	AP-42 Table 1.4-2
VOC	0.14	lb/MMBtu	19.66	9.83E-03	AP-42 Table 13.5-1
H_2SO_4	0	lb/MMscf	0	0	Negligible
CO_2 [3]	38,000.00	lb/MMscf	11,096.17	5.55	40 CFR 98 Subpart C
CH_4 [4]	3.18	lb/MMscf	0.93	4.64E-04	40 CFR 98 Subpart C
N_2O [5]	0.64	lb/MMscf	0.19	9.29E-05	40 CFR 98 Subpart C
CO_2e [6]	38,263.94	lb/MMscf	11,173.24	5.59	40 CFR 98 Subpart A

[1] Potential Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Potential Firing Rate (MMBtu/hr) or
Potential Emissions (lb/hr) = Emission Factor (lb/MMscf) x Potential Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Potential Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg per Equation C-5 of 40 CFR 98

[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-30
Potential Emission Calculations for DDU Reactor (Venting to South Flare)

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	CO2e tpy	Reference
A. Baseline Actual Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	
B. Capable of Accommodating	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C. Potential Emissions	0.00	0.07	0.03	0.00	0.00	0.00	0.01	0.00	6	
D. Demand Growth (D=B-A)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
E. Projected Actual Emissions (E=C-D)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
F. Emission Increase (F=E-A)	0.00	0.07	0.03	0.00	0.00	0.00	0.01	0.00	6	

Attachment B-31
Potential Emission Calculations for Thermal Oxidizer

Quantity	Value	Units	Reference
Potential Firing Rate:	2.00	Mscf/hr	Calculated
	2.20	MMBtu/hr	Engineering estimate
Fuel HHV:	1099	Btu/scf	Engineering estimate
Fuel H_2S Content:	50	ppmvd	Engineering estimate
Exhaust Flow:	2687	acfm, dry @ 3% O2	Engineering estimate
Hours of Operation:	8760	hr/yr	

Assumes carbon and sulfur content in process gases are negligible.

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO_X	0.098	lb/MMBtu	0.22	0.94	AP-42 Table 1.4-1
SO_2	8.31	lb/MMscf	1.66E-02	7.28E-02	Calculated
CO	8.24E-02	lb/MMBtu	0.18	0.79	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	1.64E-02	7.17E-02	AP-42 Table 1.4-2
PM_{10}	7.45E-03	lb/MMBtu	1.64E-02	7.17E-02	AP-42 Table 1.4-2
$PM_{2.5}$	7.45E-03	lb/MMBtu	1.64E-02	7.17E-02	AP-42 Table 1.4-2
VOC	20	ppmvd @ 3% O2	0.13	0.59	40 CFR 61.349(a)(2)(B)
H_2SO_4	0.12	lb/MMscf	2.49E-04	1.09E-03	TRI calculation (1.5% of SO2 emissions)
CO_2 [3]	143,822.95	lb/MMscf	287.65	1,259.89	40 CFR 98 Subpart C
CH_4 [4]	7.27	lb/MMscf	1.45E-02	6.36E-02	40 CFR 98 Subpart C
N_2O [5]	1.45	lb/MMscf	2.91E-03	1.27E-02	40 CFR 98 Subpart C
CO_2e [6]	144,426.00	lb/MMscf	288.85	1,265.17	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or
Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor = 44/12 * CC * MW / (849.5 scf/kg-mol) * 2.2 lb/kg per Equation C-5 of 40 CFR 98

[4] Emission Factor = 0.003 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[5] Emission Factor = 0.0006 kg/MMBtu * HHV * 2.2 lb/kg per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO_2, 21 for CH_4, and 310 for N_2O per Table A-1 of 40 CFR 98

Attachment B-31
Potential Emission Calculations for Thermal Oxidizer

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	CO2e tpy	Reference
A. Baseline Actual Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	New unit
B. Capable of Accommodating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	N/A
C. Projected Emissions	0.94	0.07	0.79	0.07	0.07	0.07	0.59	0.00	1,265	
D. Demand Growth (D=B-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	
E. Projected Actual Emissions (E=C-D)	0.94	0.07	0.79	0.07	0.07	0.07	0.59	0.00	1,265	
F. Emission Increase (F=E-A)	0.94	0.07	0.79	0.07	0.07	0.07	0.59	0.00	1,265	

Attachment B-32
Sum of Historical Actual Monthly Emissions for Affected Units

Date	NO_X tons [1]	SO_2 tons [1]	CO tons [1]	PM tons [1]	PM_{10} tons [1]	$PM_{2.5}$ tons [1]	VOC tons [1]	H_2SO_4 tons [1]	GHG tons CO_2e [1]
Jan-08	28.53	77.15	20.99	10.04	8.05	5.82	7.21	3.15	43,048
Feb-08	28.44	72.58	19.39	9.17	7.35	5.32	6.78	2.81	40,154
Mar-08	32.37	86.95	20.09	10.02	8.02	5.79	7.20	3.34	42,060
Apr-08	29.30	69.65	19.35	9.45	7.57	5.47	7.01	2.77	39,583
May-08	27.90	67.80	20.34	9.79	7.84	5.67	7.24	3.20	42,247
Jun-08	29.06	76.44	22.26	9.86	7.96	5.83	7.18	3.36	47,338
Jul-08	31.89	57.37	22.54	10.21	8.23	6.01	7.37	2.48	47,094
Aug-08	33.54	70.59	21.62	8.24	6.72	5.08	7.28	3.06	44,492
Sep-08	31.09	79.57	19.98	7.79	6.33	4.77	6.96	3.36	42,509
Oct-08	32.16	80.48	20.75	8.04	6.54	4.93	7.22	3.37	43,798
Nov-08	31.72	73.98	21.04	7.64	6.23	4.72	7.06	3.15	43,230
Dec-08	31.50	68.04	21.83	7.74	6.31	4.78	7.31	2.92	43,902
Jan-09	34.46	73.40	22.37	7.89	6.46	4.93	7.39	3.03	45,624
Feb-09	34.51	62.03	20.65	7.36	6.04	4.61	6.68	2.51	40,545
Mar-09	34.65	76.19	21.85	8.31	6.79	5.14	7.29	3.15	43,797
Apr-09	34.36	80.64	21.35	8.08	6.61	5.02	7.11	3.22	43,638
May-09	39.85	93.47	22.97	8.29	6.80	5.19	7.42	3.49	46,789
Jun-09	32.69	91.68	22.25	7.94	6.51	4.96	7.13	3.63	45,125
Jul-09	38.11	84.84	22.41	8.04	6.58	5.00	7.33	3.22	45,705
Aug-09	37.57	84.80	23.16	8.17	6.70	5.11	7.37	3.25	47,029
Sep-09	33.67	83.63	22.08	7.65	6.27	4.78	7.14	3.31	45,904
Oct-09	29.83	77.22	20.97	7.34	6.00	4.59	7.26	2.92	44,031
Nov-09	28.77	76.11	20.15	7.03	5.75	4.40	4.34	2.93	42,418
Dec-09	27.57	70.14	21.41	7.25	5.95	4.57	4.61	2.80	44,480
Jan-10	30.27	74.93	21.41	7.27	5.97	4.59	9.02	2.78	42,535
Feb-10	26.42	59.39	17.61	6.49	5.30	4.03	16.03	2.25	36,086
Mar-10	17.38	37.08	15.68	5.45	4.34	3.20	5.01	1.50	33,443
Apr-10	28.29	53.23	21.80	7.12	5.85	4.51	26.13	2.35	44,632
May-10	30.30	75.38	24.39	7.24	5.92	4.53	2.82	3.53	45,183
Jun-10	29.79	75.59	24.11	7.16	5.87	4.50	3.64	3.57	44,660
Jul-10	34.58	76.14	22.19	7.39	6.06	4.66	15.62	3.70	47,310
Aug-10	33.70	76.17	24.15	7.52	6.17	4.75	2.40	3.79	47,820
Sep-10	31.93	76.20	20.95	6.97	5.71	4.38	5.52	3.45	45,794

Attachment B-32
Sum of Historical Actual Monthly Emissions for Affected Units

Date	NO_X tons [1]	SO_2 tons [1]	CO tons [1]	PM tons [1]	PM_{10} tons [1]	$PM_{2.5}$ tons [1]	VOC tons [1]	H_2SO_4 tons [1]	GHG tons CO_2e [1]
Oct-10	32.65	81.72	22.68	9.51	7.67	5.62	3.53	3.76	49,253
Nov-10	31.21	68.02	20.88	9.46	7.63	5.57	5.97	3.35	47,693
Dec-10	28.06	49.35	20.89	9.16	7.37	5.38	3.65	2.34	43,459
Jan-11	28.87	51.48	23.23	9.23	7.47	5.51	8.73	2.41	45,182
Feb-11	27.00	45.80	21.20	8.14	6.56	4.79	11.56	2.01	39,188
Mar-11	31.84	62.97	23.43	9.53	7.71	5.67	9.56	2.96	47,545
Apr-11	31.75	64.11	19.82	8.97	7.25	5.34	1.37	2.91	46,524
May-11	34.06	73.94	19.10	7.88	6.48	4.96	1.09	3.37	47,649
Jun-11	30.76	58.98	16.67	7.31	6.00	4.59	1.18	2.90	45,024

References

[1] Sum of historical actual emissions from all affected emission units.
Emission totals do not include emissions from the loading racks, tanks, components, or flaring of the new DDU vessel.

Attachment B-33
Calculation of 24-month Rolling Average Emissions

Date	NO_X tpy [1]	SO_2 tpy [1]	CO tpy [1]	PM tpy [1]	PM_{10} tpy [1]	$PM_{2.5}$ tpy [1]	VOC tpy [1]	H_2SO_4 tpy [1]	GHG tons CO_2e [1]
Dec-09	386.76	917.37	255.91	100.67	81.81	61.25	83.45	37.21	527,270
Jan-10	387.63	916.26	256.12	99.28	80.76	60.64	84.36	37.02	527,014
Feb-10	386.62	909.66	255.23	97.94	79.74	59.99	88.99	36.74	524,979
Mar-10	379.13	884.73	253.02	95.66	77.89	58.70	87.89	35.83	520,671
Apr-10	378.62	876.52	254.25	94.50	77.03	58.22	97.46	35.61	523,195
May-10	379.83	880.31	256.27	93.22	76.07	57.65	95.25	35.78	524,663
Jun-10	380.19	879.89	257.20	91.87	75.03	56.98	93.48	35.88	523,324
Jul-10	381.54	889.27	257.02	90.45	73.94	56.31	97.60	36.49	523,432
Aug-10	381.62	892.06	258.29	90.09	73.67	56.14	95.16	36.86	525,097
Sep-10	382.05	890.38	258.77	89.68	73.36	55.95	94.44	36.91	526,739
Oct-10	382.29	891.00	259.74	90.42	73.92	56.30	92.59	37.10	529,466
Nov-10	382.04	888.02	259.66	91.33	74.62	56.72	92.04	37.20	531,698
Dec-10	380.32	878.67	259.20	92.05	75.15	57.02	90.21	36.91	531,476
Jan-11	377.52	867.71	259.62	92.72	75.65	57.31	90.89	36.60	531,256
Feb-11	373.77	859.60	259.90	93.11	75.91	57.40	93.32	36.36	530,577
Mar-11	372.37	852.99	260.68	93.72	76.37	57.66	94.46	36.26	532,451
Apr-11	371.06	844.73	259.92	94.16	76.70	57.83	91.59	36.10	533,895
May-11	368.16	834.96	257.99	93.95	76.53	57.71	88.43	36.04	534,325
Jun-11	367.20	818.61	255.20	93.64	76.28	57.53	85.45	35.67	534,274

The 24-month baseline periods are chosen as follows (last month in the 24-month period is shown):

Occurs:	**Nov-10**	**Jan-10**	**May-10**	**May-10**	**May-10**	**May-10**	**Dec-09**	**May-11**	**May-11**

Attachment B-33
Calculation of 24-month Rolling Average Emissions

The baseline actual emissions for each affected emission unit are as follows.

									GHG
	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	CO2e
H-101	30.43	4.53	0.00	3.79	3.79	3.79	2.84	0.06	48,997
FCCU	149.07	582.47	73.92	60.24	50.52	38.36	1.18	33.42	240,886
F-1	50.72	3.55	33.17	3.00	3.00	3.00	2.21	0.05	42,144
F-15	2.15	0.19	1.77	0.16	0.16	0.16	0.12	0.00	2,298
F-680	3.51	0.34	3.40	0.31	0.31	0.31	0.21	0.01	6,488
F-681	3.51	0.48	4.55	0.41	0.41	0.41	0.30	0.01	5,830
SRU/TGI	1.39	319.39	1.15	0.10	0.10	0.10	0.07	2.42	3,304
SRU Flare	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0
F-701	1.18	0.06	0.88	0.08	0.08	0.08	0.04	0.00	1,684
K1s	14.55	0.01	4.90	0.31	0.31	0.31	0.47	0.00	1,957
UU3	0.00	0.00	0.00	13.72	6.29	0.03	71.00	0.00	0.00
Turbines	77.54	0.48	89.39	7.19	7.19	7.19	2.30	0.01	129,880
HRSGs	47.97	4.53	43.15	3.90	3.90	3.90	2.71	0.06	50,843
Loadout	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tanks	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Components	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DDU Reactor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T.O.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**382.04**	**916.26**	**256.27**	**93.22**	**76.07**	**57.65**	**83.45**	**36.04**	**534,313**

References

[1] Baseline actual emissions are for the 24-month periods ending on the indicated dates.
Emission totals do not include emissions from the loading racks, tanks, components, or flaring of the new DDU vessel.

Attachment B-34
Netting Calculation Table

Determine Contemporaneous Period for the Project [2]	
Anticipated Date to Commence Construction:	5/1/2012
Five Years Before Commencing Construction:	5/1/2007

	Project Name [3]	Location of Emission Calcs [4]	Permit Number [5]	Date of Permit Issuance	Date of Project Change [6]	Emissions Change [7] SO$_2$ tpy
Contemporaneous Projects Creditable Increases and Decreases [8]	GHT Project	May 2007 Notice of Intent	DAQE-AN0103350030-07	10/1/2007	12/16/2008	19.24
	BenSat Unit	October 2008 Notice of Intent	DAQE-AN0103350044-09	8/12/2009	Pending	1.29
	LPG Recovery Project	February 2011 Revised Notice of Intent	DAQE-AN0103350047-11	4/25/2011	Pending	0.00
	UFU Scrubber	March 2011 Notice of Intent	DAQE-AN0103350051-11	8/25/2011	Pending	0.05
	Re-routing PDO to VRU	September 2011 Notice of Intent	Pending	Pending	Pending	1.84
	SRU Tail Gas Treatment Unit	Attachment B-14	Included in this permit action	Included in this permit action	Included in this permit action	-259.39
	Sum of Contemporaneous Creditable Increases and Decreases (tpy)					-236.97

[1] Netting Calculations: use when the Project Emissions Increase exceeds the PSD Significant Emission Rates.

[2] Contemporaneous Period: 5 years before construction commences on the current project until normal opertion commences for the current project.

[3] Project Name: as listed in permit application

[4] Location of Emission Calcs: identify file/path names and/or file location

[5] Permit Number: for the permitting action to make the contemporaneous project federally enforceable (i.e. permitted)

[6] Date of Project Change: date of initial startup or date of shutdown

[7] Emission increases should be calculated for all appropriate PSD/NSR pollutants. The complete list of PSD/NSR pollutants is: total suspended particulate matter (PM), particulate matter less than 10 microns (PM10), Sulfur Dioxide (SO2), nitrogen oxides (NOx), Carbon Monoxide (CO), Ozone (using volatile organic compounds, VOC), Lead (Pb), hydrogen sulfide (H2S), total reduced sulfur compounds (TRS), reduced sulfur compounds, flourides, Chloro flouro carbons (CFCs, 11/12/112/114/115), halons (1211, 1301, 2402), municiple waste combuster (MWC) acid gases, MWC organics, and municiple solid waste landfill emissions.

[8] Contemporaneous Projects:

Date of Project Change (see footnote 6) must be within Contemporaneous Period (see footnote 2)

Creditable Increases and Decreases: Must be federally enforceable (permitted) on and after the date construction on the current project begins.
Creditable Increases and Decreases: Cannot use an increase or decrease if it was previously relied on in issuing an enforceable PSD permit for the source.

Creditable Contemporaneous Decreases: Must take place before the date emissions increase from the current project.

Creditable Contemporaneous Decreases: Must use the lesser of actual or allowable emissions.

Attachment B-35
PSD Applicability Determination and Reasonable Possiblity Requirements

	NO_X	SO_2	CO	PM	PM_{10}	$PM_{2.5}$	VOC	H_2SO_4	GHG
Project Emission Increases	**tpy**	**tpy**	**tpy**	**tpy**	**tpy**	**tpy**	**tpy**	**tpy**	**tpy CO2e**
H-101	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
FCCU	24.93	158.85	6.93	5.70	4.90	3.89	0.00	6.74	38,230
F-1	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0
F-15	0.27	0.00	0.13	0.01	0.01	0.01	0.01	0.00	0
F-680	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
F-681	0.46	0.00	1.60	0.15	0.15	0.15	0.10	0.00	0
SRU/TGI	1.12	0.00	0.94	0.09	0.09	0.09	0.07	0.00	882
SRU Flare	0.00	15.03	0.00	0.00	0.00	0.00	0.00	0.15	4
F-701	0.30	0.05	0.93	0.08	0.08	0.08	0.07	0.00	317
K1s	0.32	0.00	0.11	0.01	0.01	0.01	0.11	0.00	46
Cooling Tower UU3	0.00	0.00	0.00	3.09	1.42	0.01	0.00	0.00	0
Cogen-Turbines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Cogen-HRSGs	0.00	0.00	0.00	0.28	0.28	0.28	0.20	0.00	0
Loadout	0.00	0.00	0.00	0.00	0.00	0.00	8.03	0.00	0
Tanks	0.00	0.00	0.00	0.00	0.00	0.00	2.39	0.00	0
Components	0.00	0.00	0.00	0.00	0.00	0.00	8.37	0.00	0
DDU Reactor	0.00	0.07	0.03	0.00	0.00	0.00	0.01	0.00	6
Thermal Oxidizer	0.94	0.07	0.79	0.07	0.07	0.07	0.59	0.00	0
Total Project Emission Increase	**28.34**	**174.07**	**11.46**	**9.47**	**7.00**	**4.58**	**19.96**	**6.90**	**39,485**
PSD Significant Emission Rate (SER)	40	40	100	25	15	10	40	7	75,000
Is Project Emission Increase Greater than PSD Significant Emission Rate?	No	**Yes**	No	No	No	No	No	No	No
Netting Analysis: Sum of Contemporaneous Creditable Increases and Decreases Excluding Project Emissions Increase (tpy)	--	-236.97	--	--	--	--	--	--	--
Net Emissions Increase [Project Emissions Increase + Netting Analysis CCI/CCD] (tpy)	--	-62.90	--	--	--	--	--	--	--
Is Net Emissions Increase Greater than PSD SER?	--	No	--	--	--	--	--	--	--

Attachment B-35
PSD Applicability Determination and Reasonable Possiblity Requirements

Reasonable Possibility Requirements

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e
Project Emission Increase	28.34	174.07	11.46	9.47	7.00	4.58	19.96	6.90	N/A
Demand Growth Exclusion	29.71	28.26	96.55	49.95	44.47	37.68	2.26	4.41	
Project Emission Increase + Demand Growth Exclusion	58.05	202.33	108.01	59.42	51.47	42.26	22.22	11.30	
PSD Significant Emission Rate (SER)	40	40	100	25	15	10	40	7	
Is Project Emission Increase Greater than 1/2 of the PSD Significant Emission Rate?	**Yes**	**Yes**	No	No	No	No	No	**Yes**	
Is Project Emission Increase + Demand Growth Exclusion Greater than 1/2 of the PSD Significant Emission Rate?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	
Is Preconstruction Determination Required?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	
Is Recordkeeping of Annual Actual Emissions Required?	**Yes**	**Yes**	No	No	No	No	No	**Yes**	

Attachment B-36
PSD Applicability Determination and Reasonable Possiblity Requirements

Emission Cap Sources (II.A.20, II.A.21, II.A.22)

Source	SO_2 Projected Emissions	NO_X Projected Emissions	PM_{10} Projected Emissions	Filterable PM_{10} Projected Emissions
F-680	0.50	4.27	0.49	0.32
F-681	0.66	5.43	0.65	0.43
Cogen-Turbines	0.17	83.90	7.92	5.21
Cogen-HRSGs	4.97	44.16	4.89	3.22
H-101	4.14	21.34	4.08	2.68
F-681	0.66	5.43	0.65	0.43
FCCU	762.25	174.00	96.55	47.79
F-1	3.48	52.99	3.43	2.26
F-15	0.22	2.79	0.21	0.14
K-1s	0.01	15.77	0.38	0.25
Total	**777.05**	**410.08**	**119.27**	**62.73**
Limit	**1637**	**598**	**95.3 [1]**	**95.3**

[1] The PM10 cap is based on calculations of only filterable PM10. The PM10 emission calculations in this application include both filterable and condensable PM10 as required by federal PSD regulations.

Attachment B-37
HAP Emission Increase Summary

HAP	FCCU lb/yr	Combustion lb/yr	Storage Tanks lb/yr	Loading Rack lb/yr	Project Emissions Increase lb/yr
Acetaldehyde	38.63	---	---	---	**38.63**
Acrolein	2.11	---	---	---	**2.11**
Benzene	37.04	2.79	0.00E+00	115.03	**154.85**
Biphenyl	---	---	0.00E+00	0.12	**0.12**
1,3-Butadiene	9.77E-02	---	---	---	**9.77E-02**
Dichlorobenzene	---	1.59	---	---	**1.59**
Ethylbenzene	0.50	---	0.00E+00	3.01	**3.52**
Formaldehyde	---	99.48	---	---	**99.48**
Hexane	---	2,387.50	1.00E-02	342.58	**2,730.09**
Isopropyl benzene	---	---	0.00E+00	0.00E+00	**0.00E+00**
Naphthalene	2.71	---	0.00E+00	0.97	**3.68**
Phenol	22.67	---	---	---	**22.67**
Toluene	6.99	4.51	3.00E-02	139.04	**150.57**
1,2,4-Trimethylbenzene	---	---	3.00E-02	0.92	**0.95**
2,2,4-Trimethylpentane	---	---	3.00E-02	30.29	**30.32**
Xylenes	6.74	---	0.13	69.14	**76.00**
POM	1.17	0.12	---	---	**1.29**
Antimony	1.74	---	---	---	**1.74**
Arsenic	8.66E-02	0.27	---	---	**0.35**
Beryllium	0.14	1.59E-02	---	---	**0.16**
Cadmium	2.51E-03	1.46	---	---	**1.46**
Chromium	0.28	1.86	---	---	**2.14**
Cobalt	1.25	0.11	---	---	**1.36**
Lead	0.49	---	---	---	**0.49**
Manganese	12.61	0.50	---	---	**13.12**
Mercury	2.51E-04	0.34	---	---	**0.35**
Nickel	55.24	2.79	---	---	**58.02**
Selenium	3.13	3.18E-02	---	---	**3.17**
Hydrochloric Acid	3,384.41	---	---	---	**3,384.41**
Carbon disulfide	1.17	---	---	---	**1.17**
Hydrogen cyanide	1,877.39	---	---	---	**1,877.39**
Total HAPs					**8,661.30**

Attachment B-38
Stack HAP Emission Calculations for Coke Burn

FCCU/CO Boiler

Quantity	Value	Units	Reference
Increased Coke Burn:	3645	lb/hr	Attachment B-4
	3.645	1,000-lb/hr	
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Emission Increase (lb/hr) [1]	Emission Increase (lb/yr) [2]	Emission Factor Reference
SO_2			36.27	317,694	Attachment B-4
PM			1.30	11,400	Attachment B-4
Acetaldehyde	1.21E-03	lb/1,000-lb	4.41E-03	38.63	Avg, from Bertrand & Seigell 2002
Acrolein	6.62E-05	lb/1,000-lb	2.41E-04	2.11	Avg, from Bertrand & Seigell 2002
Benzene	1.16E-03	lb/1,000-lb	4.23E-03	37.04	Avg, from Bertrand & Seigell 2002
1,3-Butadiene	3.06E-06	lb/1,000-lb	1.12E-05	9.77E-02	Avg, from Bertrand & Seigell 2002
Ethylbenzene	1.58E-05	lb/1,000-lb	5.76E-05	0.50	Avg, from Bertrand & Seigell 2002
Naphthalene	8.50E-05	lb/1,000-lb	3.10E-04	2.71	Avg, from Bertrand & Seigell 2002
Phenol	7.10E-04	lb/1,000-lb	2.59E-03	22.67	Avg, from Bertrand & Seigell 2002
POM	3.66E-05	lb/1,000-lb	1.33E-04	1.17	Avg, from Bertrand & Seigell 2002
Toluene	2.19E-04	lb/1,000-lb	7.98E-04	6.99	Avg, from Bertrand & Seigell 2002
Xylenes	2.11E-04	lb/1,000-lb	7.69E-04	6.74	Avg, from Bertrand & Seigell 2002
Antimony	5.45E-05	lb/1,000-lb	1.99E-04	1.74	Avg, from Bertrand & Seigell 2002
Arsenic	7.60	mg/kg PM	9.89E-06	8.66E-02	PM emission rate and composition
Beryllium	4.38E-06	lb/1,000-lb	1.60E-05	0.14	Avg, from Bertrand & Seigell 2002
Cadmium	0.22	mg/kg PM	2.86E-07	2.51E-03	PM emission rate and composition
Chromium	25.00	mg/kg PM	3.25E-05	0.28	PM emission rate and composition
Cobalt	3.90E-05	lb/1,000-lb	1.42E-04	1.25	Avg, from Bertrand & Seigell 2002
Lead	43.00	mg/kg PM	5.60E-05	0.49	PM emission rate and composition
Manganese	3.95E-04	lb/1,000-lb	1.44E-03	12.61	Avg, from Bertrand & Seigell 2002
Mercury	2.20E-02	mg/kg PM	2.86E-08	2.51E-04	PM emission rate and composition
Nickel	1.73E-03	lb/1,000-lb	6.31E-03	55.24	Avg, from Bertrand & Seigell 2002
Selenium	275.00	mg/kg PM	3.58E-04	3.13	PM emission rate and composition
Hydrochloric acid	0.11	lb/1,000-lb	0.39	3,384.41	Avg, from Bertrand & Seigell 2002
Carbon disulfide	3.68E-05	lb/1,000-lb	1.34E-04	1.17	Avg, from Bertrand & Seigell 2002
Hydrogen cyanide	5.88E-02	lb/1,000-lb	0.21	1,877.39	Avg, from Bertrand & Seigell 2002

[1] Emission Increase (lb/hr) = Emission Factor (lb/1,000-lb) x Increased Coke Burn (lb/yr) / Hours of Operation (hr/yr) OR
Emission Increase (lb/hr) = Emission Factor (mg/kg PM) x PM Emission Factor (lb/1,000-lb) / 10^6 mg/kg
x Increased Coke Burn (lb/yr) / Hours of Operation (hr/yr)

[2] Emission Increase (lb/yr) = Emission Increase (lb/hr) x Hours of Operation (hr/yr)

Attachment B-39
Stack HAP Emission Calculations for Fuel Gas Combustion

HAP	Emission Factor [1] (lb/MMBtu)	Crude Unit Furnace H-101 (lb/yr)	FCCU/CO Boiler (Natural Gas) (lbs/yr)	Ultraformer Unit Furnace F-1 (lb/yr)	UFU Regeneration Heater (lb/yr)
Benzene	2.06E-06	0.00E+00	0.00E+00	0.00E+00	1.14E-02
Dichlorobenzene	1.18E-06	0.00E+00	0.00E+00	0.00E+00	6.49E-03
Formaldehyde	7.35E-05	0.00E+00	0.00E+00	0.00E+00	0.41
Hexane	1.76E-03	0.00E+00	0.00E+00	0.00E+00	9.74
Napthalene	5.98E-07	0.00E+00	0.00E+00	0.00E+00	3.30E-03
Toluene	3.33E-06	0.00E+00	0.00E+00	0.00E+00	1.84E-02
POM	8.65E-08	0.00E+00	0.00E+00	0.00E+00	4.77E-04
Arsenic	1.96E-07	0.00E+00	0.00E+00	0.00E+00	1.08E-03
Beryllium	1.18E-08	0.00E+00	0.00E+00	0.00E+00	6.49E-05
Cadmium	1.08E-06	0.00E+00	0.00E+00	0.00E+00	5.95E-03
Chromium	1.37E-06	0.00E+00	0.00E+00	0.00E+00	7.58E-03
Cobalt	8.24E-08	0.00E+00	0.00E+00	0.00E+00	4.55E-04
Manganese	3.73E-07	0.00E+00	0.00E+00	0.00E+00	2.06E-03
Mercury	2.55E-07	0.00E+00	0.00E+00	0.00E+00	1.41E-03
Nickel	2.06E-06	0.00E+00	0.00E+00	0.00E+00	1.14E-02
Selenium	2.35E-08	0.00E+00	0.00E+00	0.00E+00	1.30E-04

[1] Source: AP-42, 5th Edition, Section 1.4, Natural Gas Combustion, Tables 1.4-3 and 1.4-4, 7/98

Attachment B-39
Stack HAP Emission Calculations for Fuel Gas Combustion

HAP	Emission Factor [1] (lb/MMBtu)	DDU Charge Heater F-680 (lb/yr)	DDU Rerun Reboiler F-681 (lb/yr)	Gasoline Hydrotreater Process Heater (lb/yr)	Ultraformer Compressors (K1s) (lb/yr)
Benzene	2.06E-06	0.00E+00	3.04E-02	1.66E-02	2.48E-03
Dichlorobenzene	1.18E-06	0.00E+00	1.74E-02	9.47E-03	1.42E-03
Formaldehyde	7.35E-05	0.00E+00	1.09	0.59	8.86E-02
Hexane	1.76E-03	0.00E+00	26.06	14.20	2.13
Napthalene	5.98E-07	0.00E+00	8.83E-03	4.81E-03	7.20E-04
Toluene	3.33E-06	0.00E+00	4.92E-02	2.68E-02	4.01E-03
POM	8.65E-08	0.00E+00	1.28E-03	6.96E-04	1.04E-04
Arsenic	1.96E-07	0.00E+00	2.90E-03	1.58E-03	2.36E-04
Beryllium	1.18E-08	0.00E+00	1.74E-04	9.47E-05	1.42E-05
Cadmium	1.08E-06	0.00E+00	1.59E-02	8.68E-03	1.30E-03
Chromium	1.37E-06	0.00E+00	2.03E-02	1.10E-02	1.65E-03
Cobalt	8.24E-08	0.00E+00	1.22E-03	6.63E-04	9.92E-05
Manganese	3.73E-07	0.00E+00	5.50E-03	3.00E-03	4.49E-04
Mercury	2.55E-07	0.00E+00	3.76E-03	2.05E-03	3.07E-04
Nickel	2.06E-06	0.00E+00	3.04E-02	1.66E-02	2.48E-03
Selenium	2.35E-08	0.00E+00	3.47E-04	1.89E-04	2.83E-05

[1] Source: AP-42, 5th Edition, Section 1.4, I

Attachment B-39
Stack HAP Emission Calculations for Fuel Gas Combustion

HAP	Emission Factor [1] (lb/MMBtu)	Turbines (lb/yr)	Cogeneration Unit HRSGs (lb/yr)	Total HAP Emissions (lb/yr)
Benzene	2.06E-06	2.28E-02	2.70	2.79
Dichlorobenzene	1.18E-06	1.30E-02	1.54	1.59
Formaldehyde	7.35E-05	0.81	96.49	99.48
Hexane	1.76E-03	19.54	2,315.84	2,387.50
Napthalene	5.98E-07	6.62E-03	0.78	0.81
Toluene	3.33E-06	3.69E-02	4.37	4.51
POM	8.65E-08	9.57E-04	0.11	0.12
Arsenic	1.96E-07	2.17E-03	0.26	0.27
Beryllium	1.18E-08	1.30E-04	1.54E-02	1.59E-02
Cadmium	1.08E-06	1.19E-02	1.42	1.46
Chromium	1.37E-06	1.52E-02	1.80	1.86
Cobalt	8.24E-08	9.12E-04	0.11	0.11
Manganese	3.73E-07	4.12E-03	0.49	0.50
Mercury	2.55E-07	2.82E-03	0.33	0.34
Nickel	2.06E-06	2.28E-02	2.70	2.79
Selenium	2.35E-08	2.60E-04	3.09E-02	3.18E-02

[1] Source: AP-42, 5th Edition, Section 1.4,

Attachment B-40
HAP Emission Calculations for Loadout Increases

Material	Component	Liquid Wt %	Vapor Wt %	Emissions lb/yr
Propane	Non-HAP VOC	100.00	100.00	219.5
Butane	Non-HAP VOC	100.00	100.00	463.0
Distillate	1,2,4-Trimethylbenzene	0.53	0.12	0.9
	2,2,4-Trimethylpentane	0.00	0.00	0.0
	Benzene	0.00	0.00	0.0
	Biphenyl	0.26	0.02	0.1
	Ethylbenzene	0.00	0.00	0.0
	Hexane	0.00	0.00	0.0
	Isopropyl benzene	0.00	0.00	0.0
	Naphthalene	0.30	0.12	1.0
	Toluene	0.00	0.00	0.0
	Xylenes	0.34	7.12	54.4
	Non-HAP VOC	98.58	92.63	707.7
Jet Kerosene	1,2,4-Trimethylbenzene	1.71	0.30	0.0
	2,2,4-Trimethylpentane	0.00	0.00	0.0
	Benzene	0.00	0.00	0.0
	Biphenyl	0.30	0.01	0.0
	Ethylbenzene	0.08	1.54	0.0
	Hexane	0.00	0.00	0.0
	Isopropyl benzene	0.00	0.00	0.0
	Naphthalene	0.51	0.17	0.0
	Toluene	0.18	10.40	0.1
	Xylenes	1.20	19.91	0.3
	Non-HAP VOC	96.03	67.67	0.9
Alkylate	1,2,4-Trimethylbenzene	0.00	0.00	0.0
	2,2,4-Trimethylpentane	15.66	2.61	0.0
	Benzene	0.00	0.00	0.0
	Biphenyl	0.00	0.00	0.0
	Ethylbenzene	0.00	0.00	0.0
	Hexane	0.00	0.00	0.0
	Isopropyl benzene	0.00	0.00	0.0
	Naphthalene	0.00	0.00	0.0
	Toluene	6.12	0.57	0.0
	Xylenes	0.00	0.00	0.0
	Non-HAP VOC	78.23	96.82	0.0
ULP 91 CNV	1,2,4-Trimethylbenzene	0.83	0.00	0.0
	2,2,4-Trimethylpentane	1.20	0.21	30.3
	Benzene	2.32	0.79	115.0
	Biphenyl	0.00	0.00	0.0
	Ethylbenzene	0.65	0.02	3.0
	Hexane	4.29	2.34	342.6
	Isopropyl benzene	0.00	0.00	0.0
	Naphthalene	0.19	0.00	0.0
	Toluene	9.88	0.95	138.9
	Xylenes	3.66	0.10	14.5
	Non-HAP VOC	76.98	95.59	13974.1

Attachment B-40
HAP Emission Calculations for Loadout Increases

Material	Component	Liquid Wt %	Vapor Wt %	Emissions lb/yr
Total	1,2,4-Trimethylbenzene			0.9
	2,2,4-Trimethylpentane			30.3
	Benzene			115.0
	Biphenyl			0.1
	Ethylbenzene			3.0
	Hexane			342.6
	Isopropyl benzene			0.0
	Naphthalene			1.0
	Toluene			139.0
	Xylenes			69.1
	Non-HAP VOC			15365.3
	Total VOC			16066.4
	Total HAP Increase			**701.1**

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	188 (New tank, heated)
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	Black wax crude

Tank Dimensions

Diameter (ft):	135.00
Volume (gallons):	4,200,000.00
Turnovers:	87.60
Self Supp. Roof? (y/n):	N
No. of Columns:	8.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Characteristics

Deck Fitting Category:	Typical
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	8
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	49
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Heated Tank, UT (Avg Atmospheric Pressure = 14.7 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

188 (New tank, heated) - Internal Floating Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Black Wax Crude	Jan	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	Feb	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	Mar	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	Apr	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	May	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	Jun	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	Jul	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	

Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	Aug	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	Sep	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	Oct	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	Nov	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude	Dec	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.3026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0308	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4841	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.5997	N/A	N/A	1.3748	0.9266	0.0124	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1702	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

188 (New tank, heated) - Internal Floating Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	6.9330	6.9330	6.9330	6.9330	6.9330	6.9330	6.9330	6.9330	6.9330	6.9330	6.9330	6.9330
Seal Factor A (lb-mole/ft-yr):	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Value of Vapor Pressure Function:	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900
Tank Diameter (ft):	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Withdrawal Losses (lb):	236.5795	236.5795	236.5795	236.5795	236.5795	236.5795	236.5795	236.5795	236.5795	236.5795	236.5795	236.5795
Number of Columns:	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000	8.0000
Effective Column Diameter (ft):	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Net Throughput (gal/mo.):	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060
Average Organic Liquid Density (lb/gal):	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000
Tank Diameter (ft):	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000
Deck Fitting Losses (lb):	29.1217	29.1217	29.1217	29.1217	29.1217	29.1217	29.1217	29.1217	29.1217	29.1217	29.1217	29.1217
Value of Vapor Pressure Function:	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	907.3000	907.3000	907.3000	907.3000	907.3000	907.3000	907.3000	907.3000	907.3000	907.3000	907.3000	907.3000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000	135.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Total Losses (lb):	272.6343	272.6343	272.6343	272.6343	272.6343	272.6343	272.6343	272.6343	272.6343	272.6343	272.6343	272.6343

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	13.8660
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	5.3923
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	8	47.00	0.00	0.00	144.8223
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00	0.00	29.2726
Roof Leg or Hanger Well/Adjustable	49	7.90	0.00	0.00	149.0977
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	4.6220
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	2.3880

TANKS 4.0.9d
Emissions Report - Detail Format

Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

188 (New tank, heated) - Internal Floating Roof Tank
Salt Lake City, Utah

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Black Wax Crude	83.20	2,838.95	349.46	0.00	3,271.61
Benzene	25.17	11.07	105.74	0.00	141.99
Naphthalene	2.56	110.72	10.76	0.00	124.04
Toluene	40.27	45.71	169.16	0.00	255.14
Unidentified Components	1.03	2,630.58	4.34	0.00	2,635.95
Xylenes (mixed isomers)	14.16	40.88	59.47	0.00	114.50

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	190 (Incremental)
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	TUF

Tank Dimensions

Diameter (ft):	117.00
Volume (gallons):	2,350,000.00
Turnovers:	0.02

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

Roof Characteristics

Type:	Double Deck
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Riveted
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1
Roof Drain (3-in. Diameter)/90% Closed	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	24
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

TANKS 4.0.9d
Emissions Report - Detail Format

Liquid Contents of Storage Tank

190 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
TUF	Jan	42.19	38.38	46.01	51.98	2.2508	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0394	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.6975	N/A	N/A	78.1100	0.0464	0.0192	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0409	0.0014	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0196	0.0137	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0239	N/A	N/A	120.2000	0.0024	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.1850	N/A	N/A	92.1300	0.2331	0.0256	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.2392	N/A	N/A	67.9501	0.3675	0.9330	83.08	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.2507	0.0070	106.17	Option 2: A=7.009, B=1462.266, C=215.11
TUF	Feb	45.35	40.84	49.87	51.98	2.4118	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0394	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.7668	N/A	N/A	78.1100	0.0464	0.0197	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0409	0.0014	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0196	0.0140	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0272	N/A	N/A	120.2000	0.0024	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2058	N/A	N/A	92.1300	0.2331	0.0265	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.6039	N/A	N/A	67.9105	0.3675	0.9308	83.08	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.2507	0.0073	106.17	Option 2: A=7.009, B=1462.266, C=215.11
TUF	Mar	49.25	43.96	54.55	51.98	2.6232	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0394	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.8602	N/A	N/A	78.1100	0.0464	0.0203	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0409	0.0015	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0196	0.0143	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0318	N/A	N/A	120.2000	0.0024	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2342	N/A	N/A	92.1300	0.2331	0.0277	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.0816	N/A	N/A	67.8605	0.3675	0.9280	83.08	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.2507	0.0078	106.17	Option 2: A=7.009, B=1462.266, C=215.11
TUF	Apr	53.24	46.98	59.49	51.98	2.8546	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0394	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.9652	N/A	N/A	78.1100	0.0464	0.0209	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0409	0.0016	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0196	0.0146	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0372	N/A	N/A	120.2000	0.0024	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2665	N/A	N/A	92.1300	0.2331	0.0290	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.6027	N/A	N/A	67.8081	0.3675	0.9252	83.08	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.2507	0.0083	106.17	Option 2: A=7.009, B=1462.266, C=215.11
TUF	May	57.74	50.54	64.93	51.98	3.1358	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0394	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.0964	N/A	N/A	78.1100	0.0464	0.0216	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0409	0.0017	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0196	0.0150	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0442	N/A	N/A	120.2000	0.0024	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.3076	N/A	N/A	92.1300	0.2331	0.0305	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.2339	N/A	N/A	67.7474	0.3675	0.9219	83.08	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.2507	0.0089	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TUF	Jun	62.65	54.94	70.36	51.98	3.4682	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0394	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.2564	N/A	N/A	78.1100	0.0464	0.0224	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0409	0.0019	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0196	0.0154	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0531	N/A	N/A	120.2000	0.0024	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.3584	N/A	N/A	92.1300	0.2331	0.0321	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.9769	N/A	N/A	67.6792	0.3675	0.9182	83.08	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.2507	0.0096	106.17	Option 2: A=7.009, B=1462.266, C=215.11
TUF	Jul	66.53	58.63	74.43	51.98	3.7503	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0394	0.0004	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.3960	N/A	N/A	78.1100	0.0464	0.0230	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0409	0.0020	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0196	0.0158	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0612	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.4034	N/A	N/A	92.1300	0.2331	0.0334	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						8.6054	N/A	N/A	67.6240	0.3675	0.9153	83.08	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.2507	0.0101	106.17	Option 2: A=7.009, B=1462.266, C=215.11
TUF	Aug	65.15	57.72	72.57	51.98	3.6476	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0394	0.0004	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.3448	N/A	N/A	78.1100	0.0464	0.0228	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0409	0.0019	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0196	0.0156	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0582	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.3868	N/A	N/A	92.1300	0.2331	0.0330	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						8.3769	N/A	N/A	67.6439	0.3675	0.9163	83.08	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.2507	0.0099	106.17	Option 2: A=7.009, B=1462.266, C=215.11
TUF	Sep	59.98	52.93	67.04	51.98	3.2845	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0394	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.1674	N/A	N/A	78.1100	0.0464	0.0220	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0409	0.0018	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0196	0.0152	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0481	N/A	N/A	120.2000	0.0024	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.3300	N/A	N/A	92.1300	0.2331	0.0312	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5666	N/A	N/A	67.7165	0.3675	0.9202	83.08	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.2507	0.0092	106.17	Option 2: A=7.009, B=1462.266, C=215.11
TUF	Oct	54.07	48.01	60.13	51.98	2.9052	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0394	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.9885	N/A	N/A	78.1100	0.0464	0.0211	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0409	0.0017	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0196	0.0147	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0384	N/A	N/A	120.2000	0.0024	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2738	N/A	N/A	92.1300	0.2331	0.0293	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.7165	N/A	N/A	67.7970	0.3675	0.9245	83.08	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.2507	0.0084	106.17	Option 2: A=7.009, B=1462.266, C=215.11
TUF	Nov	48.04	43.61	52.46	51.98	2.5558	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0394	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.8301	N/A	N/A	78.1100	0.0464	0.0201	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0409	0.0015	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0196	0.0142	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0303	N/A	N/A	120.2000	0.0024	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2250	N/A	N/A	92.1300	0.2331	0.0274	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.9294	N/A	N/A	67.8762	0.3675	0.9289	83.08	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.2507	0.0077	106.17	Option 2: A=7.009, B=1462.266, C=215.11
TUF	Dec	42.89	39.34	46.44	51.98	2.2858	N/A	N/A	69.0000			92.00	Option 4: RVP=6.64, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0394	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.7124	N/A	N/A	78.1100	0.0464	0.0193	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0409	0.0014	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0196	0.0138	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0246	N/A	N/A	120.2000	0.0024	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.1895	N/A	N/A	92.1300	0.2331	0.0258	92.13	Option 2: A=6.954, B=1344.8, C=219.48

Unidentified Components	5.3184	N/A	N/A	67.9414	0.3675	0.9325	83.08	
Xylenes (mixed isomers)	0.0483	N/A	N/A	106.1700	0.2507	0.0071	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

190 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June
Rim Seal Losses (lb):	239.2353	285.0649	375.3345	430.7795	466.4155	524.4019
Seal Factor A (lb-mole/ft-yr):	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000
Seal-related Wind Speed Exponent:	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000
Value of Vapor Pressure Function:	0.0490	0.0529	0.0581	0.0639	0.0711	0.0800
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.2508	2.4118	2.6232	2.8546	3.1358	3.4682
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049
Net Throughput (gal/mo.):	3,059.0000	3,059.0000	3,059.0000	3,059.0000	3,059.0000	3,059.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Roof Fitting Losses (lb):	313.2786	388.8710	551.1878	643.4393	688.8697	774.5124
Value of Vapor Pressure Function:	0.0490	0.0529	0.0581	0.0639	0.0711	0.0800
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,112.6032	1,279.3814	1,650.8822	1,751.6667	1,684.1254	1,684.1254
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000
Total Losses (lb):	552.5188	673.9409	926.5273	1,074.2237	1,155.2901	1,298.9192

Month:	July	August	September	October	November	December
Rim Seal Losses (lb):	583.4028	580.3820	471.3768	374.2034	299.2741	247.4799
Seal Factor A (lb-mole/ft-yr):	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Average Wind Speed (mph):	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000
Value of Vapor Pressure Function:	0.0877	0.0849	0.0751	0.0652	0.0564	0.0498
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.7503	3.6476	3.2845	2.9052	2.5558	2.2858
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049
Net Throughput (gal/mo.):	3,059.0000	3,059.0000	3,059.0000	3,059.0000	3,059.0000	3,059.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Roof Fitting Losses (lb):	866.5419	871.7118	684.2320	523.7525	405.5641	326.3587
Value of Vapor Pressure Function:	0.0877	0.0849	0.0751	0.0652	0.0564	0.0498
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,717.7202	1,785.9648	1,585.4505	1,397.5920	1,250.7070	1,139.5217
Average Wind Speed (mph):	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	1,449.9496	1,452.0987	1,155.6137	897.9608	704.8431	573.8436

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	7.3132
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	59.0720
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	6.1048
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	13.0382
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	175.4890
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	24	0.82	0.53	0.14	165.0741
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	6,626.4091

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

190 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
TUF	4,877.35	0.06	7,038.32	0.00	11,915.73
1,2,4-Trimethylbenzene	1.49	0.00	2.16	0.00	3.66
Benzene	104.36	0.00	150.91	0.00	255.27
Ethylbenzene	8.35	0.00	12.10	0.00	20.45
Hexane (-n)	72.63	0.00	104.97	0.00	177.61
Isopropyl benzene	0.22	0.00	0.32	0.00	0.53
Toluene	146.52	0.01	212.06	0.00	358.59
Unidentified Components	4,501.18	0.02	6,494.09	0.00	10,995.29
Xylenes (mixed isomers)	42.60	0.01	61.72	0.00	104.33

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	206 (IFR)
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	

Tank Dimensions

Diameter (ft):	136.00
Volume (gallons):	2,499,359.51
Turnovers:	147.21
Self Supp. Roof? (y/n):	N
No. of Columns:	9.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Characteristics

Deck Fitting Category:	Typical
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	9
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	50
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Heated Tank, UT (Avg Atmospheric Pressure = 14.7 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

206 (IFR) - Internal Floating Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Black Wax Crude	Jan	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	Feb	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	Mar	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	Apr	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	May	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	Jun	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	Jul	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	Aug	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	Sep	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	Oct	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	Nov	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	
Black Wax Crude	Dec	180.01	180.01	180.01	180.02	1.0900	N/A	N/A	50.0000			270.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

206 (IFR) - Internal Floating Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	6.9843	6.9843	6.9843	6.9843	6.9843	6.9843	6.9843	6.9843	6.9843	6.9843	6.9843	6.9843
Seal Factor A (lb-mole/ft-yr):	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Value of Vapor Pressure Function:	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900	1.0900
Tank Diameter (ft):	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Withdrawal Losses (lb):	236.3735	236.3735	236.3735	236.3735	236.3735	236.3735	236.3735	236.3735	236.3735	236.3735	236.3735	236.3735
Number of Columns:	9.0000	9.0000	9.0000	9.0000	9.0000	9.0000	9.0000	9.0000	9.0000	9.0000	9.0000	9.0000
Effective Column Diameter (ft):	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Net Throughput (gal/mo.):	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000	30,660,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060
Average Organic Liquid Density (lb/gal):	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000
Tank Diameter (ft):	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000
Deck Fitting Losses (lb):	30.8839	30.8839	30.8839	30.8839	30.8839	30.8839	30.8839	30.8839	30.8839	30.8839	30.8839	30.8839
Value of Vapor Pressure Function:	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	962.2000	962.2000	962.2000	962.2000	962.2000	962.2000	962.2000	962.2000	962.2000	962.2000	962.2000	962.2000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000	136.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Total Losses (lb):	274.2417	274.2417	274.2417	274.2417	274.2417	274.2417	274.2417	274.2417	274.2417	274.2417	274.2417	274.2417

Roof Fitting/Status	Quantity	KFa(lb-mole/yr)	Roof Fitting Loss Factors KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	13.8660
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	5.3923
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	9	47.00	0.00	0.00	162.9251
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00	0.00	29.2726
Roof Leg or Hanger Well/Adjustable	50	7.90	0.00	0.00	152.1405
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	4.6220
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	2.3880

TANKS 4.0.9d
Emissions Report - Detail Format

Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

206 (IFR) - Internal Floating Roof Tank
Salt Lake City, Utah

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Black Wax Crude	83.81	~~2,836.48~~	370.61	0.00	~~3,290.90~~

454.42 lb standing losses

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification		
User Identification:	212 (Incremental)	
City:	Salt Lake City	
State:	Utah	
Company:		
Type of Tank:	Vertical Fixed Roof Tank	
Description:	LSD	
Tank Dimensions		
Shell Height (ft):		29.50
Diameter (ft):		117.00
Liquid Height (ft) :		27.00
Avg. Liquid Height (ft):		12.00
Volume (gallons):		2,378,000.00
Turnovers:		0.04
Net Throughput(gal/yr):		87,150.00
Is Tank Heated (y/n):	N	
Paint Characteristics		
Shell Color/Shade:	White/White	
Shell Condition	Good	
Roof Color/Shade:	White/White	
Roof Condition:	Good	
Roof Characteristics		
Type:	Cone	
Height (ft)		3.70
Slope (ft/ft) (Cone Roof)		0.06
Breather Vent Settings		
Vacuum Settings (psig):		0.00
Pressure Settings (psig)		0.00

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

212 (Incremental) - Vertical Fixed Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Distillate fuel oil no. 2	Jan	42.19	38.38	46.01	51.98	0.0034	0.0031	0.0039	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0097	0.0082	0.0114	120.1900	0.0053	0.0216	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0011	0.0009	0.0013	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0031	0.0028	0.0030	132.4907	0.9858	0.9087	189.45	
Xylenes (mixed isomers)						0.0470	0.0405	0.0543	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Feb	45.35	40.84	49.87	51.98	0.0038	0.0032	0.0045	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0111	0.0091	0.0135	120.1900	0.0053	0.0220	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0013	0.0010	0.0016	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0035	0.0032	0.0034	132.4914	0.9858	0.9084	189.45	
Xylenes (mixed isomers)						0.0530	0.0446	0.0627	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Mar	49.25	43.96	54.55	51.98	0.0044	0.0037	0.0054	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0131	0.0105	0.0164	120.1900	0.0053	0.0227	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0015	0.0012	0.0019	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0040	0.0036	0.0039	132.5359	0.9858	0.9067	189.45	
Xylenes (mixed isomers)						0.0613	0.0503	0.0744	106.1700	0.0034	0.0690	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Apr	53.24	46.98	59.49	51.98	0.0051	0.0041	0.0064	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0155	0.0119	0.0200	120.1900	0.0053	0.0229	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0002	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0018	0.0014	0.0024	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0047	0.0042	0.0045	132.5097	0.9858	0.9072	189.45	
Xylenes (mixed isomers)						0.0710	0.0564	0.0888	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	May	57.74	50.54	64.93	51.98	0.0060	0.0046	0.0077	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0187	0.0139	0.0248	120.1900	0.0053	0.0235	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0022	0.0016	0.0031	128.2000	0.0030	0.0016	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0055	0.0049	0.0053	132.5194	0.9858	0.9066	189.45	
Xylenes (mixed isomers)						0.0834	0.0643	0.1073	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Jun	62.65	54.94	70.36	51.98	0.0072	0.0055	0.0091	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0227	0.0166	0.0306	120.1900	0.0053	0.0241	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0028	0.0020	0.0039	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0065	0.0058	0.0062	132.5376	0.9858	0.9056	189.45	
Xylenes (mixed isomers)						0.0991	0.0755	0.1289	106.1700	0.0034	0.0685	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Jul	66.53	58.63	74.43	51.98	0.0081	0.0062	0.0103	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0264	0.0193	0.0357	120.1900	0.0053	0.0247	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0003	0.0002	0.0004	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0033	0.0023	0.0046	128.2000	0.0030	0.0018	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0074	0.0065	0.0071	132.5630	0.9858	0.9045	189.45	

Xylenes (mixed isomers)						0.1133	0.0861	0.1476	106.1700	0.0034	0.0689	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Aug	65.15	57.72	72.57	51.98	0.0078	0.0060	0.0098	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0250	0.0186	0.0333	120.1900	0.0053	0.0245	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0003	0.0002	0.0004	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0031	0.0022	0.0043	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0071	0.0063	0.0068	132.5495	0.9858	0.9050	189.45	
Xylenes (mixed isomers)						0.1081	0.0834	0.1388	106.1700	0.0034	0.0686	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Sep	59.98	52.93	67.04	51.98	0.0065	0.0051	0.0083	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0204	0.0153	0.0270	120.1900	0.0053	0.0239	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0025	0.0018	0.0034	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0059	0.0053	0.0057	132.5455	0.9858	0.9056	189.45	
Xylenes (mixed isomers)						0.0903	0.0702	0.1153	106.1700	0.0034	0.0688	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Oct	54.07	48.01	60.13	51.98	0.0053	0.0042	0.0065	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0161	0.0125	0.0205	120.1900	0.0053	0.0230	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0002	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0019	0.0014	0.0025	128.2000	0.0030	0.0016	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0048	0.0043	0.0047	132.5065	0.9858	0.9073	189.45	
Xylenes (mixed isomers)						0.0732	0.0586	0.0908	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Nov	48.04	43.61	52.46	51.98	0.0042	0.0036	0.0050	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0125	0.0103	0.0150	120.1900	0.0053	0.0224	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0014	0.0012	0.0018	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0038	0.0035	0.0038	132.5176	0.9858	0.9074	189.45	
Xylenes (mixed isomers)						0.0586	0.0496	0.0690	106.1700	0.0034	0.0686	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Dec	42.89	39.34	46.44	51.98	0.0035	0.0031	0.0040	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0100	0.0085	0.0116	120.1900	0.0053	0.0217	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0011	0.0009	0.0013	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0032	0.0029	0.0031	132.4876	0.9858	0.9087	189.45	
Xylenes (mixed isomers)						0.0483	0.0421	0.0552	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

212 (Incremental) - Vertical Fixed Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	15.5840	18.6153	27.1567	35.7598	49.0882	59.1433	69.9966	63.3520	49.5869	36.8526	21.2247	14.8928
Vapor Space Volume (cu ft):	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760
Vapor Density (lb/cu ft):	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Vapor Space Expansion Factor:	0.0305	0.0359	0.0418	0.0489	0.0559	0.0593	0.0604	0.0569	0.0545	0.0473	0.0350	0.0283
Vented Vapor Saturation Factor:	0.9966	0.9962	0.9957	0.9949	0.9940	0.9929	0.9920	0.9923	0.9936	0.9948	0.9958	0.9965
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Vapor Space Outage (ft):	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333
Tank Shell Height (ft):	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000
Average Liquid Height (ft):	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000
Roof Outage (ft):	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333
Roof Outage (Cone Roof)												
Roof Outage (ft):	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333
Roof Height (ft):	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000
Roof Slope (ft/ft):	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600
Shell Radius (ft):	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000
Vapor Density												
Vapor Density (lb/cu ft):	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Daily Avg. Liquid Surface Temp. (deg. R):	501.8630	505.0233	508.9222	512.9051	517.4062	522.3207	526.2015	524.8172	519.6544	513.7415	507.7078	502.5640
Daily Average Ambient Temp. (deg. F):	27.8500	34.1000	41.8000	49.6000	58.7500	69.1000	77.9500	75.6000	65.1000	53.1500	40.8500	29.7000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R):	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525
Tank Paint Solar Absorptance (Shell):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	617.0902	922.6212	1,303.0279	1,713.2580	2,067.0141	2,335.4245	2,325.5891	2,064.7932	1,660.5912	1,172.9472	710.0503	533.0136
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0305	0.0359	0.0418	0.0489	0.0559	0.0593	0.0604	0.0569	0.0545	0.0473	0.0350	0.0283
Daily Vapor Temperature Range (deg. R):	15.2493	18.0717	21.1784	25.0031	28.7750	30.8446	31.5898	29.7004	28.2084	24.2312	17.7078	14.2011
Daily Vapor Pressure Range (psia):	0.0008	0.0013	0.0018	0.0023	0.0031	0.0036	0.0041	0.0037	0.0032	0.0023	0.0014	0.0009
Breather Vent Press. Setting Range(psia):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0031	0.0032	0.0037	0.0041	0.0046	0.0055	0.0062	0.0060	0.0051	0.0042	0.0036	0.0031
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0039	0.0045	0.0054	0.0064	0.0077	0.0091	0.0103	0.0098	0.0083	0.0065	0.0050	0.0040
Daily Avg. Liquid Surface Temp. (deg R):	501.8630	505.0233	508.9222	512.9051	517.4062	522.3207	526.2015	524.8172	519.6544	513.7415	507.7078	502.5640
Daily Min. Liquid Surface Temp. (deg R):	498.0506	500.5054	503.6276	506.6543	510.2125	514.6095	518.3040	517.3921	512.6023	507.6837	503.2808	499.0138
Daily Max. Liquid Surface Temp. (deg R):	505.6753	509.5412	514.2168	519.1559	524.5999	530.0318	534.0989	532.2423	526.7065	519.7993	512.1348	506.1143
Daily Ambient Temp. Range (deg. R):	17.1000	19.0000	20.8000	23.4000	26.3000	27.4000	28.5000	27.6000	28.2000	25.9000	19.9000	16.2000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.9966	0.9962	0.9957	0.9949	0.9940	0.9929	0.9920	0.9923	0.9936	0.9948	0.9958	0.9965
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035

Vapor Space Outage (ft):	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333
Working Losses (lb):	0.0766	0.0865	0.0988	0.1157	0.1359	0.1610	0.1828	0.1750	0.1460	0.1195	0.0950	0.0788
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Net Throughput (gal/mo.):	7,262.5000	7,262.5000	7,262.5000	7,262.5000	7,262.5000	7,262.5000	7,262.5000	7,262.5000	7,262.5000	7,262.5000	7,262.5000	7,262.5000
Annual Turnovers:	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366
Turnover Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Maximum Liquid Volume (gal):	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000
Maximum Liquid Height (ft):	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	15.6606	18.7018	27.2555	35.8755	49.2241	59.3043	70.1795	63.5270	49.7329	36.9720	21.3197	14.9716

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

212 (Incremental) - Vertical Fixed Roof Tank
Salt Lake City, Utah

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	1.47	461.25	462.72
1,2,4-Trimethylbenzene	0.03	10.87	10.91
Biphenyl	0.00	0.05	0.05
Naphthalene	0.00	0.75	0.75
Unidentified Components	1.33	417.98	419.32
Xylenes (mixed isomers)	0.10	31.60	31.70

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	242 (Incremental)
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline-ULR85WIN / HCN

Tank Dimensions

Diameter (ft):	117.00
Volume (gallons):	2,334,000.00
Turnovers:	0.02

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

Roof Characteristics

Type:	Pontoon
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Unslotted Guide-Pole Well/Ungasketed Sliding Cover	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	19
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	24

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

TANKS 4.0.9d
Emissions Report - Detail Format

Liquid Contents of Storage Tank

242 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
HCN	Jan	42.19	38.38	46.01	51.98	2.3936	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.6975	N/A	N/A	78.1100	0.0057	0.0026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7324	N/A	N/A	84.1600	0.0012	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0108	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0062	0.0049	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1850	N/A	N/A	92.1300	0.0356	0.0044	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.8349	N/A	N/A	68.7547	0.8456	0.9846	111.49	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0641	0.0020	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Feb	45.35	40.84	49.87	51.98	2.5635	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7668	N/A	N/A	78.1100	0.0057	0.0027	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8033	N/A	N/A	84.1600	0.0012	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0108	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0062	0.0050	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0013	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2058	N/A	N/A	92.1300	0.0356	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.0350	N/A	N/A	68.7458	0.8456	0.9841	111.49	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0641	0.0021	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Mar	49.25	43.96	54.55	51.98	2.7866	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8602	N/A	N/A	78.1100	0.0057	0.0028	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8987	N/A	N/A	84.1600	0.0012	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0108	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0062	0.0051	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0015	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2342	N/A	N/A	92.1300	0.0356	0.0048	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.2975	N/A	N/A	68.7345	0.8456	0.9835	111.49	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0641	0.0022	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Apr	53.24	46.98	59.49	51.98	3.0306	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9652	N/A	N/A	78.1100	0.0057	0.0029	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0056	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0108	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0062	0.0052	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0018	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2665	N/A	N/A	92.1300	0.0356	0.0050	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.5845	N/A	N/A	68.7228	0.8456	0.9828	111.49	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0641	0.0024	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	May	57.74	50.54	64.93	51.98	3.3270	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3

1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0964	N/A	N/A	78.1100	0.0057	0.0030	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1390	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0108	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0062	0.0054	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0022	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3076	N/A	N/A	92.1300	0.0356	0.0052	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.9327	N/A	N/A	68.7092	0.8456	0.9821	111.49	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0641	0.0026	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Jun	62.65	54.94	70.36	51.98	3.6770	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0263	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.2564	N/A	N/A	78.1100	0.0057	0.0031	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3010	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0108	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0062	0.0055	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0028	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3584	N/A	N/A	92.1300	0.0356	0.0055	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.3437	N/A	N/A	68.6940	0.8456	0.9813	111.49	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0641	0.0028	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Jul	66.53	58.63	74.43	51.98	3.9739	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0263	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3960	N/A	N/A	78.1100	0.0057	0.0032	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4421	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0108	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0062	0.0057	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0033	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.4034	N/A	N/A	92.1300	0.0356	0.0058	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.6922	N/A	N/A	68.6817	0.8456	0.9806	111.49	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.0641	0.0029	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Aug	65.15	57.72	72.57	51.98	3.8659	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0263	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3448	N/A	N/A	78.1100	0.0057	0.0032	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3904	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0108	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0062	0.0056	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0031	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3868	N/A	N/A	92.1300	0.0356	0.0057	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.5654	N/A	N/A	68.6861	0.8456	0.9808	111.49	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.0641	0.0029	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Sep	59.98	52.93	67.04	51.98	3.4836	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.1674	N/A	N/A	78.1100	0.0057	0.0030	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2109	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0108	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0062	0.0055	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0025	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3300	N/A	N/A	92.1300	0.0356	0.0054	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.1167	N/A	N/A	68.7023	0.8456	0.9817	111.49	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.0641	0.0026	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Oct	54.07	48.01	60.13	51.98	3.0840	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9885	N/A	N/A	78.1100	0.0057	0.0029	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0294	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0108	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0062	0.0053	86.17	Option 2: A=6.876, B=1171.17, C=224.41

Naphthalene						0.0019	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2738	N/A	N/A	92.1300	0.0356	0.0050	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.6472	N/A	N/A	68.7203	0.8456	0.9827	111.49	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.0641	0.0024	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Nov	48.04	43.61	52.46	51.98	2.7155	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8301	N/A	N/A	78.1100	0.0057	0.0028	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8680	N/A	N/A	84.1600	0.0012	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0108	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0062	0.0051	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0014	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2250	N/A	N/A	92.1300	0.0356	0.0047	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.2138	N/A	N/A	68.7381	0.8456	0.9837	111.49	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.0641	0.0022	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Dec	42.89	39.34	46.44	51.98	2.4305	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7124	N/A	N/A	78.1100	0.0057	0.0027	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7477	N/A	N/A	84.1600	0.0012	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0108	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0062	0.0049	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1895	N/A	N/A	92.1300	0.0356	0.0044	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.8783	N/A	N/A	68.7527	0.8456	0.9845	111.49	
Xylenes (mixed isomers)						0.0483	N/A	N/A	106.1700	0.0641	0.0020	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

242 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	126.9531	146.1812	180.6565	204.3106	223.4703	251.3637	278.3910	274.1986	229.3328	187.7915	154.3337	130.5641
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Value of Vapor Pressure Function:	0.0524	0.0566	0.0622	0.0684	0.0762	0.0857	0.0940	0.0910	0.0804	0.0698	0.0604	0.0533
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.3936	2.5635	2.7866	3.0306	3.3270	3.6770	3.9739	3.8659	3.4836	3.0840	2.7155	2.4305
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070
Net Throughput (gal/mo.):	3,783.5000	3,783.5000	3,783.5000	3,783.5000	3,783.5000	3,783.5000	3,783.5000	3,783.5000	3,783.5000	3,783.5000	3,783.5000	3,783.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Roof Fitting Losses (lb):	520.4484	620.3145	815.4736	935.4023	1,013.5589	1,140.0705	1,268.6293	1,261.1857	1,025.1952	814.2746	651.2738	538.4415
Value of Vapor Pressure Function:	0.0524	0.0566	0.0622	0.0684	0.0762	0.0857	0.0940	0.0910	0.0804	0.0698	0.0604	0.0533
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,726.7231	1,906.5032	2,281.5283	2,378.3532	2,313.6707	2,313.6707	2,345.9460	2,410.8916	2,217.6452	2,029.2750	1,876.1705	1,756.3133
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	647.4084	766.5026	996.1372	1,139.7199	1,237.0362	1,391.4411	1,547.0273	1,535.3912	1,254.5350	1,002.0731	805.6145	669.0126

Roof Fitting/Status	Quantity	KFa(lb-mole/yr)	Roof Fitting Loss Factors KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	7.8327
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	267.2850
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	63.2691
Unslotted Guide-Pole Well/Ungasketed Sliding Cover	1	31.00	150.00	1.40	9,736.5074
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	2.8806
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	19	2.00	0.37	0.91	368.5295
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	24	0.82	0.53	0.14	176.8005

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

242 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
HCN	2,387.55	0.08	10,604.27	0.00	12,991.90
1,2,4-Trimethylbenzene	0.55	0.00	2.44	0.00	2.99
2,2,4-Trimethylpentane (isooctane)	0.70	0.00	3.11	0.00	3.81
Benzene	7.06	0.00	31.41	0.00	38.47
Cyclohexane	1.58	0.00	7.05	0.00	8.63
Ethylbenzene	1.21	0.00	5.38	0.00	6.59
Hexane (-n)	12.72	0.00	56.58	0.00	69.31
Naphthalene	0.01	0.00	0.04	0.00	0.05
Toluene	12.30	0.00	54.79	0.00	67.10
Unidentified Components	2,345.43	0.07	10,416.80	0.00	12,762.31
Xylenes (mixed isomers)	5.98	0.01	26.67	0.00	32.65

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	307 (Incremental)
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	STUF / Toluene

Tank Dimensions

Diameter (ft):	40.00
Volume (gallons):	280,000.00
Turnovers:	0.02

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

Roof Characteristics

Type:	Pontoon
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	8
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	4

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

TANKS 4.0.9d
Emissions Report - Detail Format

Liquid Contents of Storage Tank

307 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
STUF	Jan	42.19	38.38	46.01	51.98	1.4491	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0394	0.0004	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.6975	N/A	N/A	78.1100	0.0464	0.0298	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0409	0.0021	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0196	0.0213	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0239	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.1850	N/A	N/A	92.1300	0.2331	0.0397	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.2694	N/A	N/A	67.3176	0.3675	0.8959	83.08	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.2507	0.0108	106.17	Option 2: A=7.009, B=1462.266, C=215.11
STUF	Feb	45.35	40.84	49.87	51.98	1.5582	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0394	0.0004	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.7668	N/A	N/A	78.1100	0.0464	0.0304	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0409	0.0022	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0196	0.0216	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0272	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2058	N/A	N/A	92.1300	0.2331	0.0411	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.5066	N/A	N/A	67.2588	0.3675	0.8928	83.08	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.2507	0.0114	106.17	Option 2: A=7.009, B=1462.266, C=215.11
STUF	Mar	49.25	43.96	54.55	51.98	1.7020	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0394	0.0004	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.8602	N/A	N/A	78.1100	0.0464	0.0313	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0409	0.0024	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0196	0.0220	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0318	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2342	N/A	N/A	92.1300	0.2331	0.0428	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8181	N/A	N/A	67.1849	0.3675	0.8890	83.08	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.2507	0.0120	106.17	Option 2: A=7.009, B=1462.266, C=215.11
STUF	Apr	53.24	46.98	59.49	51.98	1.8600	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0394	0.0004	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.9652	N/A	N/A	78.1100	0.0464	0.0321	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0409	0.0025	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0196	0.0225	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0372	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2665	N/A	N/A	92.1300	0.2331	0.0445	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.1590	N/A	N/A	67.1078	0.3675	0.8851	83.08	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.2507	0.0128	106.17	Option 2: A=7.009, B=1462.266, C=215.11
STUF	May	57.74	50.54	64.93	51.98	2.0529	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0394	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.0964	N/A	N/A	78.1100	0.0464	0.0330	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0409	0.0027	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0196	0.0229	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0442	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.3076	N/A	N/A	92.1300	0.2331	0.0466	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.5732	N/A	N/A	67.0186	0.3675	0.8807	83.08	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.2507	0.0136	106.17	Option 2: A=7.009, B=1462.266, C=215.11

STUF	Jun	62.65	54.94	70.36	51.98	2.2820	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0394	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.2564	N/A	N/A	78.1100	0.0464	0.0341	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0409	0.0028	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0196	0.0235	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0531	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.3584	N/A	N/A	92.1300	0.2331	0.0488	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.0626	N/A	N/A	66.9189	0.3675	0.8757	83.08	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.2507	0.0145	106.17	Option 2: A=7.009, B=1462.266, C=215.11
STUF	Jul	66.53	58.63	74.43	51.98	2.4774	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0394	0.0006	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.3960	N/A	N/A	78.1100	0.0464	0.0349	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0409	0.0030	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0196	0.0238	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0612	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.4034	N/A	N/A	92.1300	0.2331	0.0506	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4780	N/A	N/A	66.8385	0.3675	0.8718	83.08	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.2507	0.0153	106.17	Option 2: A=7.009, B=1462.266, C=215.11
STUF	Aug	65.15	57.72	72.57	51.98	2.4062	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0394	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.3448	N/A	N/A	78.1100	0.0464	0.0346	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0409	0.0029	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0196	0.0237	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0582	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.3868	N/A	N/A	92.1300	0.2331	0.0500	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.3268	N/A	N/A	66.8674	0.3675	0.8732	83.08	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.2507	0.0150	106.17	Option 2: A=7.009, B=1462.266, C=215.11
STUF	Sep	59.98	52.93	67.04	51.98	2.1552	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0394	0.0005	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.1674	N/A	N/A	78.1100	0.0464	0.0335	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0409	0.0027	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0196	0.0232	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0481	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.3300	N/A	N/A	92.1300	0.2331	0.0476	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.7922	N/A	N/A	66.9733	0.3675	0.8784	83.08	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.2507	0.0140	106.17	Option 2: A=7.009, B=1462.266, C=215.11
STUF	Oct	54.07	48.01	60.13	51.98	1.8946	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0394	0.0004	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.9885	N/A	N/A	78.1100	0.0464	0.0323	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0409	0.0025	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0196	0.0226	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0384	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2738	N/A	N/A	92.1300	0.2331	0.0449	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.2336	N/A	N/A	67.0914	0.3675	0.8843	83.08	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.2507	0.0129	106.17	Option 2: A=7.009, B=1462.266, C=215.11
STUF	Nov	48.04	43.61	52.46	51.98	1.6560	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0394	0.0004	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.8301	N/A	N/A	78.1100	0.0464	0.0310	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0409	0.0023	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0196	0.0219	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0303	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2250	N/A	N/A	92.1300	0.2331	0.0422	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.7187	N/A	N/A	67.2081	0.3675	0.8902	83.08	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.2507	0.0118	106.17	Option 2: A=7.009, B=1462.266, C=215.11
STUF	Dec	42.89	39.34	46.44	51.98	1.4727	N/A	N/A	69.0000			92.00	Option 4: RVP=4.55, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0394	0.0004	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						0.7124	N/A	N/A	78.1100	0.0464	0.0299	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0409	0.0022	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0196	0.0214	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isopropyl benzene						0.0246	N/A	N/A	120.2000	0.0024	0.0001	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.1895	N/A	N/A	92.1300	0.2331	0.0400	92.13	Option 2: A=6.954, B=1344.8, C=219.48

Unidentified Components	3.3209	N/A	N/A	67.3046	0.3675	0.8952	83.08	
Xylenes (mixed isomers)	0.0483	N/A	N/A	106.1700	0.2507	0.0110	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

307 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	25.1895	29.0279	35.8955	40.6010	44.3870	49.8580	55.1189	54.3281	45.5278	37.3169	30.6610	25.9112
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Value of Vapor Pressure Function:	0.0304	0.0329	0.0361	0.0398	0.0443	0.0497	0.0545	0.0527	0.0467	0.0406	0.0351	0.0309
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.4491	1.5582	1.7020	1.8600	2.0529	2.2820	2.4774	2.4062	2.1552	1.8946	1.6560	1.4727
Tank Diameter (ft):	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019
Net Throughput (gal/mo.):	404.2500	404.2500	404.2500	404.2500	404.2500	404.2500	404.2500	404.2500	404.2500	404.2500	404.2500	404.2500
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000	40.0000
Roof Fitting Losses (lb):	194.0907	241.3476	342.7696	400.3507	428.4597	481.2702	537.7764	541.3617	425.3206	325.5411	251.7993	202.2702
Value of Vapor Pressure Function:	0.0304	0.0329	0.0361	0.0398	0.0443	0.0497	0.0545	0.0527	0.0467	0.0406	0.0351	0.0309
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,109.5513	1,277.0790	1,650.0842	1,751.2455	1,683.4530	1,683.4530	1,717.1734	1,785.6692	1,584.4015	1,395.7905	1,248.2796	1,136.5945
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	219.2822	270.3774	378.6670	440.9536	472.8485	531.1301	592.8972	595.6917	470.8503	362.8599	282.4622	228.1834

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	4.5468
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	3.7955
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	4,119.8056
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	36.7268
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	109.1067
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	8	2.00	0.37	0.91	90.0742
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	4	0.82	0.53	0.14	17.1053

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

307 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
STUF	473.82	0.02	4,372.36	0.00	4,846.20
1,2,4-Trimethylbenzene	0.22	0.00	2.05	0.00	2.27
Benzene	15.48	0.00	143.33	0.00	158.82
Ethylbenzene	1.24	0.00	11.48	0.00	12.72
Hexane (-n)	10.78	0.00	99.72	0.00	110.50
Isopropyl benzene	0.03	0.00	0.30	0.00	0.33
Toluene	21.71	0.01	201.38	0.00	223.10
Unidentified Components	418.06	0.01	3,855.49	0.00	4,273.56
Xylenes (mixed isomers)	6.30	0.01	58.59	0.00	64.90

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	321 (Incremental)
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	Alkylation Feed

Tank Dimensions

Diameter (ft):		60.00
Volume (gallons):		1,008,000.00
Turnovers:		0.04
Self Supp. Roof? (y/n):	N	
No. of Columns:		1.00
Eff. Col. Diam. (ft):		2.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	None

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Leg or Hanger Well/Adjustable	20
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Column Well (24-in. Diam.)/Pipe Col.-Sliding Cover, Gask.	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Stub Drain (1-inch diameter)/Stub Drain (1-inch diameter)	28
Access Hatch (24-in. Diam.)/Unbolted Cover, Gasketed	1

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

321 (Incremental) - Internal Floating Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Pentane (-n)	Jan	42.19	38.38	46.01	51.98	4.5397	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Feb	45.35	40.84	49.87	51.98	4.8921	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Mar	49.25	43.96	54.55	51.98	5.3578	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Apr	53.24	46.98	59.49	51.98	5.8709	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	May	57.74	50.54	64.93	51.98	6.4992	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Jun	62.65	54.94	70.36	51.98	7.2477	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Jul	66.53	58.63	74.43	51.98	7.8879	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Aug	65.15	57.72	72.57	51.98	7.6544	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Sep	59.98	52.93	67.04	51.98	6.8333	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Oct	54.07	48.01	60.13	51.98	5.9837	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Nov	48.04	43.61	52.46	51.98	5.2089	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Dec	42.89	39.34	46.44	51.98	4.6160	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

321 (Incremental) - Internal Floating Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	231.7106	254.6461	286.5120	323.9005	373.4081	438.7895	501.5032	477.8078	401.6442	332.4673	276.1257	236.5952
Seal Factor A (lb-mole/ft-yr):	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Value of Vapor Pressure Function:	0.1107	0.1217	0.1369	0.1548	0.1785	0.2097	0.2397	0.2284	0.1920	0.1589	0.1320	0.1131
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.5397	4.8921	5.3578	5.8709	6.4992	7.2477	7.8879	7.6544	6.8333	5.9837	5.2089	4.6160
Tank Diameter (ft):	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000
Vapor Molecular Weight (lb/lb-mole):	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	0.0090	0.0090	0.0090	0.0090	0.0090	0.0090	0.0090	0.0090	0.0090	0.0090	0.0090	0.0090
Number of Columns:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Effective Column Diameter (ft):	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
Net Throughput (gal/mo.):	2,969.7500	2,969.7500	2,969.7500	2,969.7500	2,969.7500	2,969.7500	2,969.7500	2,969.7500	2,969.7500	2,969.7500	2,969.7500	2,969.7500
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530
Tank Diameter (ft):	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000
Deck Fitting Losses (lb):	230.4455	253.2558	284.9477	322.1321	371.3694	436.3938	498.7651	475.1991	399.4513	330.6521	274.6181	235.3035
Value of Vapor Pressure Function:	0.1107	0.1217	0.1369	0.1548	0.1785	0.2097	0.2397	0.2284	0.1920	0.1589	0.1320	0.1131
Vapor Molecular Weight (lb/lb-mole):	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000
Vapor Molecular Weight (lb/lb-mole):	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	462.1651	507.9110	571.4688	646.0417	744.7866	875.1923	1,000.2773	953.0160	801.1046	663.1284	550.7529	471.9077

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	73.7932
Roof Leg or Hanger Well/Adjustable	20	7.90	0.00	0.00	1,880.5361
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00	0.00	904.5617
Column Well (24-in. Diam.)/Pipe Col.-Sliding Cover, Gask.	1	25.00	0.00	0.00	297.5532
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	51.1791
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	142.8255
Stub Drain (1-inch diameter)/Stub Drain (1-inch diameter)	28	1.20	0.00	0.00	399.9115
Access Hatch (24-in. Diam.)/Unbolted Cover, Gasketed	1	31.00	5.20	1.30	368.9660

TANKS 4.0.9d

Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

321 (Incremental) - Internal Floating Roof Tank
Salt Lake City, Utah

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Pentane (-n)	4,135.11	0.11	4,112.53	0.00	8,247.75

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	324 (Incremental)
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline-ULR87PAS

Tank Dimensions

Diameter (ft):	114.50
Volume (gallons):	2,310,000.00
Turnovers:	0.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

Roof Characteristics

Type:	Pontoon
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	Quantity
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	2
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Roof Drain (3-in. Diameter)/90% Closed	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	5
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	12

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

TANKS 4.0.9d
Emissions Report - Detail Format

Liquid Contents of Storage Tank

324 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
MUL Gasoline (RVP 13.0)	Jan	42.19	38.38	46.01	51.98	4.9232	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.0398	0.0042	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.6975	N/A	N/A	78.1100	0.0186	0.0039	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7324	N/A	N/A	84.1600	0.0095	0.0021	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0266	0.0095	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1850	N/A	N/A	92.1300	0.1233	0.0069	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.1826	N/A	N/A	61.4399	0.6500	0.9718	88.97	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0922	0.0013	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 12.5)	Feb	45.35	40.84	49.87	51.98	5.0105	N/A	N/A	64.0000			92.00	Option 4: RVP=12.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.0398	0.0044	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7668	N/A	N/A	78.1100	0.0186	0.0041	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8033	N/A	N/A	84.1600	0.0095	0.0022	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0266	0.0099	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0013	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2058	N/A	N/A	92.1300	0.1233	0.0073	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.2980	N/A	N/A	63.4343	0.6500	0.9704	88.97	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0922	0.0014	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Mar	49.25	43.96	54.55	51.98	3.4801	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.0398	0.0067	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8602	N/A	N/A	78.1100	0.0186	0.0062	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8987	N/A	N/A	84.1600	0.0095	0.0033	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0147	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0266	0.0149	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0015	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2342	N/A	N/A	92.1300	0.1233	0.0112	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.0019	N/A	N/A	67.2097	0.6500	0.9549	88.97	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0922	0.0022	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Apr	53.24	46.98	59.49	51.98	3.7765	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.0398	0.0070	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9652	N/A	N/A	78.1100	0.0186	0.0064	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0056	N/A	N/A	84.1600	0.0095	0.0034	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0266	0.0153	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0018	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2665	N/A	N/A	92.1300	0.1233	0.0118	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4209	N/A	N/A	67.1773	0.6500	0.9532	88.97	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0922	0.0023	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	May	57.74	50.54	64.93	51.98	4.1357	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3

1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.0398	0.0073	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0964	N/A	N/A	78.1100	0.0186	0.0067	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1390	N/A	N/A	84.1600	0.0095	0.0035	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0266	0.0157	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0022	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3076	N/A	N/A	92.1300	0.1233	0.0124	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.9277	N/A	N/A	67.1399	0.6500	0.9513	88.97	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0922	0.0025	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Jun	62.65	54.94	70.36	51.98	4.5589	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0242	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.0398	0.0076	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.2564	N/A	N/A	78.1100	0.0186	0.0069	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3010	N/A	N/A	84.1600	0.0095	0.0037	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0266	0.0162	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0028	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3584	N/A	N/A	92.1300	0.1233	0.0131	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.5234	N/A	N/A	67.0982	0.6500	0.9491	88.97	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0922	0.0027	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Jul	66.53	58.63	74.43	51.98	4.9172	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0242	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.0398	0.0079	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3960	N/A	N/A	78.1100	0.0186	0.0071	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4421	N/A	N/A	84.1600	0.0095	0.0038	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0147	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0266	0.0166	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0033	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.4034	N/A	N/A	92.1300	0.1233	0.0137	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.0267	N/A	N/A	67.0647	0.6500	0.9474	88.97	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.0922	0.0029	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.0)	Aug	65.15	57.72	72.57	51.98	4.4779	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0242	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.0398	0.0083	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3448	N/A	N/A	78.1100	0.0186	0.0076	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3904	N/A	N/A	84.1600	0.0095	0.0040	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0147	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0266	0.0176	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0031	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3868	N/A	N/A	92.1300	0.1233	0.0144	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.3841	N/A	N/A	67.0103	0.6500	0.9444	88.97	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.0922	0.0030	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 9.0)	Sep	59.98	52.93	67.04	51.98	4.6097	N/A	N/A	67.0000			92.00	Option 4: RVP=9, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.0398	0.0071	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.1674	N/A	N/A	78.1100	0.0186	0.0065	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2109	N/A	N/A	84.1600	0.0095	0.0034	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0266	0.0152	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0025	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3300	N/A	N/A	92.1300	0.1233	0.0121	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.6178	N/A	N/A	66.1409	0.6500	0.9527	88.97	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.0922	0.0025	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 11.0)	Oct	54.07	48.01	60.13	51.98	5.1418	N/A	N/A	65.0000			92.00	Option 4: RVP=11, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.0398	0.0055	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9885	N/A	N/A	78.1100	0.0186	0.0051	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0294	N/A	N/A	84.1600	0.0095	0.0027	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0147	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0266	0.0120	86.17	Option 2: A=6.876, B=1171.17, C=224.41

Naphthalene						0.0019	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2738	N/A	N/A	92.1300	0.1233	0.0093	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.4470	N/A	N/A	64.3045	0.6500	0.9632	88.97	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.0922	0.0019	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 12.5)	Nov	48.04	43.61	52.46	51.98	5.2837	N/A	N/A	64.0000			92.00	Option 4: RVP=12.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.0398	0.0045	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8301	N/A	N/A	78.1100	0.0186	0.0042	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8680	N/A	N/A	84.1600	0.0095	0.0022	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0266	0.0101	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0014	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2250	N/A	N/A	92.1300	0.1233	0.0075	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.6913	N/A	N/A	63.4170	0.6500	0.9696	88.97	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.0922	0.0015	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 13.0)	Dec	42.89	39.34	46.44	51.98	4.9928	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.0398	0.0042	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7124	N/A	N/A	78.1100	0.0186	0.0039	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7477	N/A	N/A	84.1600	0.0095	0.0021	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0266	0.0095	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1895	N/A	N/A	92.1300	0.1233	0.0069	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.2829	N/A	N/A	61.4354	0.6500	0.9716	88.97	
Xylenes (mixed isomers)						0.0483	N/A	N/A	106.1700	0.0922	0.0013	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

324 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	261.3065	294.2752	225.0898	254.8554	279.2534	314.9362	349.7284	316.4448	305.9826	321.9147	312.0029	269.0037
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Value of Vapor Pressure Function:	0.1227	0.1255	0.0803	0.0885	0.0987	0.1113	0.1225	0.1089	0.1129	0.1298	0.1345	0.1249
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.9232	5.0105	3.4801	3.7765	4.1357	4.5589	4.9172	4.4779	4.6097	5.1418	5.2837	4.9928
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Vapor Molecular Weight (lb/lb-mole):	62.0000	64.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	67.0000	65.0000	64.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
Net Throughput (gal/mo.):	397.2500	397.2500	397.2500	397.2500	397.2500	397.2500	397.2500	397.2500	397.2500	397.2500	397.2500	397.2500
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Roof Fitting Losses (lb):	706.4165	857.8223	752.8070	879.9864	944.0357	1,064.6639	1,194.9196	1,104.1084	1,001.3013	984.2074	898.4437	736.6682
Value of Vapor Pressure Function:	0.1227	0.1255	0.0803	0.0885	0.0987	0.1113	0.1225	0.1089	0.1129	0.1298	0.1345	0.1249
Vapor Molecular Weight (lb/lb-mole):	62.0000	64.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	67.0000	65.0000	64.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,114.3423	1,281.6824	1,654.3109	1,755.3778	1,687.6482	1,687.6482	1,721.3372	1,789.7701	1,588.6911	1,400.2685	1,252.9143	1,141.3543
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	967.7236	1,152.0981	977.8974	1,134.8425	1,223.2897	1,379.6007	1,544.6486	1,420.5539	1,307.2845	1,306.1227	1,210.4472	1,005.6725

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	2	0.71	0.10	1.00	19.7277
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	95.4062
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	10,414.6251
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	11.9233
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	21.0927
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	284.2229
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	5	2.00	0.37	0.91	146.3501
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	12	0.82	0.53	0.14	134.3974

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

324 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
MUL Gasoline (RVP 11.0)	321.91	0.00	984.21	0.00	1,306.12
1,2,4-Trimethylbenzene	0.03	0.00	0.11	0.00	0.14
2,2,4-Trimethylpentane (isooctane)	1.77	0.00	5.40	0.00	7.17
Benzene	1.63	0.00	4.98	0.00	6.61
Cyclohexane	0.87	0.00	2.65	0.00	3.52
Ethylbenzene	0.11	0.00	0.35	0.00	0.47
Hexane (-n)	3.86	0.00	11.80	0.00	15.66
Naphthalene	0.00	0.00	0.00	0.00	0.00
Toluene	2.99	0.00	9.14	0.00	12.13
Unidentified Components	310.05	0.00	947.94	0.00	1,258.00
Xylenes (mixed isomers)	0.60	0.00	1.83	0.00	2.42
MUL Gasoline (RVP 12.5)	606.28	0.00	1,756.27	0.00	2,362.55
1,2,4-Trimethylbenzene	0.05	0.00	0.14	0.00	0.19
2,2,4-Trimethylpentane (isooctane)	2.71	0.00	7.84	0.00	10.54
Benzene	2.51	0.00	7.28	0.00	9.80
Cyclohexane	1.35	0.00	3.90	0.00	5.24
Ethylbenzene	0.17	0.00	0.49	0.00	0.65
Hexane (-n)	6.04	0.00	17.49	0.00	23.53
Naphthalene	0.00	0.00	0.00	0.00	0.00
Toluene	4.50	0.00	13.02	0.00	17.52
Unidentified Components	588.09	0.00	1,703.59	0.00	2,291.68
Xylenes (mixed isomers)	0.87	0.00	2.52	0.00	3.39
MUL Gasoline (RVP 13.0)	530.31	0.00	1,443.08	0.00	1,973.40
1,2,4-Trimethylbenzene	0.04	0.00	0.10	0.00	0.14

2,2,4-Trimethylpentane (isooctane)	2.23	0.00	6.06	0.00	8.29
Benzene	2.08	0.00	5.66	0.00	7.74
Cyclohexane	1.12	0.00	3.04	0.00	4.16
Ethylbenzene	0.13	0.00	0.37	0.00	0.50
Hexane (-n)	5.04	0.00	13.71	0.00	18.74
Naphthalene	0.00	0.00	0.00	0.00	0.00
Toluene	3.66	0.00	9.97	0.00	13.64
Unidentified Components	515.31	0.00	1,402.28	0.00	1,917.59
Xylenes (mixed isomers)	0.70	0.00	1.90	0.00	2.59
MUL Gasoline (RVP 8.0)	316.44	0.00	1,104.11	0.00	1,420.55
1,2,4-Trimethylbenzene	0.06	0.00	0.20	0.00	0.26
2,2,4-Trimethylpentane (isooctane)	2.63	0.00	9.16	0.00	11.78
Benzene	2.39	0.00	8.34	0.00	10.74
Cyclohexane	1.26	0.00	4.41	0.00	5.68
Ethylbenzene	0.18	0.00	0.64	0.00	0.82
Hexane (-n)	5.56	0.00	19.40	0.00	24.95
Naphthalene	0.00	0.00	0.00	0.00	0.00
Toluene	4.56	0.00	15.91	0.00	20.46
Unidentified Components	298.85	0.00	1,042.73	0.00	1,341.58
Xylenes (mixed isomers)	0.95	0.00	3.32	0.00	4.27
MUL Gasoline (RVP 8.5)	1,423.86	0.00	4,836.41	0.00	6,260.28
1,2,4-Trimethylbenzene	0.22	0.00	0.73	0.00	0.95
2,2,4-Trimethylpentane (isooctane)	10.45	0.00	35.51	0.00	45.96
Benzene	9.58	0.00	32.56	0.00	42.14
Cyclohexane	5.09	0.00	17.28	0.00	22.37
Ethylbenzene	0.70	0.00	2.38	0.00	3.09
Hexane (-n)	22.51	0.00	76.48	0.00	98.99
Naphthalene	0.00	0.00	0.00	0.00	0.01
Toluene	17.90	0.00	60.82	0.00	78.72
Unidentified Components	1,353.75	0.00	4,598.24	0.00	5,951.99
Xylenes (mixed isomers)	3.65	0.00	12.41	0.00	16.06
MUL Gasoline (RVP 9.0)	305.98	0.00	1,001.30	0.00	1,307.28
1,2,4-Trimethylbenzene	0.04	0.00	0.15	0.00	0.19
2,2,4-Trimethylpentane (isooctane)	2.16	0.00	7.07	0.00	9.23
Benzene	1.98	0.00	6.48	0.00	8.46
Cyclohexane	1.05	0.00	3.43	0.00	4.48
Ethylbenzene	0.15	0.00	0.48	0.00	0.62

	4.64	0.00	15.19	0.00	19.83
Naphthalene	0.00	0.00	0.00	0.00	0.00
Toluene	3.71	0.00	12.13	0.00	15.84
Unidentified Components	291.50	0.00	953.89	0.00	1,245.39
Xylenes (mixed isomers)	0.76	0.00	2.48	0.00	3.24

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	328 (Incremental)
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	DAN

Tank Dimensions

Diameter (ft):	114.50
Volume (gallons):	2,310,000.00
Turnovers:	0.04

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Poor

Roof Characteristics

Type:	Double Deck
Fitting Category	Detail

Tank Construction and Rim-Seal System

Construction:	Riveted
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Fitting/Status	Quantity
Roof Drain (3-in. Diameter)/90% Closed	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	17
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

TANKS 4.0.9d
Emissions Report - Detail Format

Liquid Contents of Storage Tank

328 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
DAN	Jan	43.59	39.05	48.14	53.00	3.8856	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						0.7275	N/A	N/A	78.1100	0.0226	0.0064	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7631	N/A	N/A	84.1600	0.0455	0.0135	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						1.2277	N/A	N/A	86.1700	0.1001	0.0477	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.1940	N/A	N/A	92.1300	0.0164	0.0012	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.6838	N/A	N/A	63.8868	0.8139	0.9312	101.48	
Xylenes (mixed isomers)						0.0496	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	Feb	47.16	41.55	52.78	53.00	4.1797	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						0.8090	N/A	N/A	78.1100	0.0226	0.0066	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8465	N/A	N/A	84.1600	0.0455	0.0139	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						1.3562	N/A	N/A	86.1700	0.1001	0.0490	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2186	N/A	N/A	92.1300	0.0164	0.0013	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.0302	N/A	N/A	63.8531	0.8139	0.9292	101.48	
Xylenes (mixed isomers)						0.0567	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	Mar	51.57	44.73	58.42	53.00	4.5674	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						0.9201	N/A	N/A	78.1100	0.0226	0.0069	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9598	N/A	N/A	84.1600	0.0455	0.0144	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						1.5300	N/A	N/A	86.1700	0.1001	0.0506	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2526	N/A	N/A	92.1300	0.0164	0.0014	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4859	N/A	N/A	63.8111	0.8139	0.9268	101.48	
Xylenes (mixed isomers)						0.0668	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	Apr	56.11	47.82	64.40	53.00	4.9956	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						1.0473	N/A	N/A	78.1100	0.0226	0.0071	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0891	N/A	N/A	84.1600	0.0455	0.0149	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						1.7275	N/A	N/A	86.1700	0.1001	0.0522	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2921	N/A	N/A	92.1300	0.0164	0.0014	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.9878	N/A	N/A	63.7676	0.8139	0.9242	101.48	
Xylenes (mixed isomers)						0.0787	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	May	61.08	51.43	70.74	53.00	5.5020	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						1.2034	N/A	N/A	78.1100	0.0226	0.0074	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2474	N/A	N/A	84.1600	0.0455	0.0155	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						1.9680	N/A	N/A	86.1700	0.1001	0.0540	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3414	N/A	N/A	92.1300	0.0164	0.0015	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.5799	N/A	N/A	63.7195	0.8139	0.9215	101.48	
Xylenes (mixed isomers)						0.0939	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	Jun	66.36	55.87	76.85	53.00	6.0829	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						1.3895	N/A	N/A	78.1100	0.0226	0.0078	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4355	N/A	N/A	84.1600	0.0455	0.0162	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						2.2522	N/A	N/A	86.1700	0.1001	0.0559	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.4013	N/A	N/A	92.1300	0.0164	0.0016	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.2570	N/A	N/A	63.6681	0.8139	0.9185	101.48	
Xylenes (mixed isomers)						0.1126	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	Jul	70.23	59.56	80.89	53.00	6.5391	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						1.5405	N/A	N/A	78.1100	0.0226	0.0080	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.5878	N/A	N/A	84.1600	0.0455	0.0166	84.16	Option 2: A=6.841, B=1201.53, C=222.65

Hexane (-n)						2.4813	N/A	N/A	86.1700	0.1001	0.0573	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.4505	N/A	N/A	92.1300	0.0164	0.0017	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.7874	N/A	N/A	63.6303	0.8139	0.9163	101.48	
Xylenes (mixed isomers)						0.1284	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	Aug	68.49	58.61	78.37	53.00	6.3312	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						1.4712	N/A	N/A	78.1100	0.0226	0.0079	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.5179	N/A	N/A	84.1600	0.0455	0.0164	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						2.3763	N/A	N/A	86.1700	0.1001	0.0567	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.4278	N/A	N/A	92.1300	0.0164	0.0017	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5459	N/A	N/A	63.6473	0.8139	0.9173	101.48	
Xylenes (mixed isomers)						0.1211	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	Sep	62.79	53.76	71.81	53.00	5.6844	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						1.2610	N/A	N/A	78.1100	0.0226	0.0076	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3057	N/A	N/A	84.1600	0.0455	0.0157	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						2.0563	N/A	N/A	86.1700	0.1001	0.0546	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3599	N/A	N/A	92.1300	0.0164	0.0016	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.7928	N/A	N/A	63.7029	0.8139	0.9205	101.48	
Xylenes (mixed isomers)						0.0996	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	Oct	56.22	48.76	63.67	53.00	5.0065	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						1.0506	N/A	N/A	78.1100	0.0226	0.0071	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0925	N/A	N/A	84.1600	0.0455	0.0150	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						1.7326	N/A	N/A	86.1700	0.1001	0.0522	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2931	N/A	N/A	92.1300	0.0164	0.0014	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.0005	N/A	N/A	63.7665	0.8139	0.9242	101.48	
Xylenes (mixed isomers)						0.0790	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	Nov	49.56	44.29	54.83	53.00	4.3872	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						0.8680	N/A	N/A	78.1100	0.0226	0.0067	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.9067	N/A	N/A	84.1600	0.0455	0.0142	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						1.4486	N/A	N/A	86.1700	0.1001	0.0498	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2366	N/A	N/A	92.1300	0.0164	0.0013	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.2742	N/A	N/A	63.8303	0.8139	0.9279	101.48	
Xylenes (mixed isomers)						0.0620	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
DAN	Dec	44.18	40.00	48.37	53.00	3.9329	N/A	N/A	65.0000			98.00	Option 4: RVP=10.35, ASTM Slope=3
Benzene						0.7405	N/A	N/A	78.1100	0.0226	0.0064	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7764	N/A	N/A	84.1600	0.0455	0.0135	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Hexane (-n)						1.2482	N/A	N/A	86.1700	0.1001	0.0479	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.1979	N/A	N/A	92.1300	0.0164	0.0012	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.7395	N/A	N/A	63.8813	0.8139	0.9309	101.48	
Xylenes (mixed isomers)						0.0507	N/A	N/A	106.1700	0.0016	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

328 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	412.2690	497.1373	664.9638	777.1597	857.3309	982.5439	1,103.6905	1,083.7062	857.8694	663.5672	519.2496	425.4318
Seal Factor A (lb-mole/ft-yr):	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000
Value of Vapor Pressure Function:	0.0915	0.1000	0.1116	0.1250	0.1418	0.1626	0.1800	0.1719	0.1482	0.1254	0.1061	0.0929
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	3.8856	4.1797	4.5674	4.9956	5.5020	6.0829	6.5391	6.3312	5.6844	5.0065	4.3872	3.9329
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Vapor Molecular Weight (lb/lb-mole):	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121
Net Throughput (gal/mo.):	7,329.0000	7,329.0000	7,329.0000	7,329.0000	7,329.0000	7,329.0000	7,329.0000	7,329.0000	7,329.0000	7,329.0000	7,329.0000	7,329.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Roof Fitting Losses (lb):	546.4874	687.3054	991.4525	1,178.9927	1,285.7564	1,473.5409	1,664.8162	1,653.3614	1,263.9727	941.9065	713.0154	568.0322
Value of Vapor Pressure Function:	0.0915	0.1000	0.1116	0.1250	0.1418	0.1626	0.1800	0.1719	0.1482	0.1254	0.1061	0.0929
Vapor Molecular Weight (lb/lb-mole):	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000	65.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,102.1838	1,268.9112	1,640.3197	1,741.0827	1,673.5556	1,673.5556	1,707.1433	1,775.3738	1,574.9027	1,387.0898	1,240.2450	1,129.0935
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	958.7685	1,184.4547	1,656.4283	1,956.1645	2,143.0993	2,456.0969	2,768.5188	2,737.0797	2,121.8541	1,605.4858	1,232.2771	993.4761

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	24.1147
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	11.2927
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	109.2783
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	12,298.5419
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	13.5132
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	17	0.82	0.53	0.14	216.0904
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	324.5296

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

328 (Incremental) - External Floating Roof Tank
Salt Lake City, Utah

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
DAN	8,844.92	0.14	12,968.64	0.00	21,813.70
Benzene	64.90	0.00	95.41	0.00	160.32
Cyclohexane	135.57	0.01	199.26	0.00	334.84
Hexane (-n)	471.75	0.01	693.12	0.00	1,164.89
Toluene	13.29	0.00	19.56	0.00	32.86
Unidentified Components	8,159.04	0.12	11,960.76	0.00	20,119.92
Xylenes (mixed isomers)	0.36	0.00	0.52	0.00	0.88

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	331 (Incremental)
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	Alky / DAN

Tank Dimensions

Diameter (ft):	86.00
Volume (gallons):	1,260,000.00
Turnovers:	0.06
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	2.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

Deck Characteristics

Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Column Well (24-in. Diam.)/Pipe Col.-Sliding Cover, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Fixed	20
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Access Hatch (24-in. Diam.)/Unbolted Cover, Gasketed	1
Stub Drain (1-inch diameter)/Stub Drain (1-inch diameter)	59
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

331 (Incremental) - Internal Floating Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Alkylate	Jan	42.19	38.38	46.01	51.98	2.0157	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.1566	0.0432	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.1850	N/A	N/A	92.1300	0.0612	0.0089	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.5116	N/A	N/A	67.6203	0.7823	0.9479	110.86	
Alkylate	Feb	45.35	40.84	49.87	51.98	2.1617	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.1566	0.0444	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.2058	N/A	N/A	92.1300	0.0612	0.0093	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.6908	N/A	N/A	67.5776	0.7823	0.9463	110.86	
Alkylate	Mar	49.25	43.96	54.55	51.98	2.3537	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.1566	0.0460	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.2342	N/A	N/A	92.1300	0.0612	0.0097	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.9260	N/A	N/A	67.5244	0.7823	0.9443	110.86	
Alkylate	Apr	53.24	46.98	59.49	51.98	2.5641	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.1566	0.0476	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.2665	N/A	N/A	92.1300	0.0612	0.0101	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.1832	N/A	N/A	67.4695	0.7823	0.9423	110.86	
Alkylate	May	57.74	50.54	64.93	51.98	2.8200	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.1566	0.0494	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.3076	N/A	N/A	92.1300	0.0612	0.0106	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.4957	N/A	N/A	67.4067	0.7823	0.9400	110.86	
Alkylate	Jun	62.65	54.94	70.36	51.98	3.1229	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.1566	0.0514	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.3584	N/A	N/A	92.1300	0.0612	0.0112	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8646	N/A	N/A	67.3375	0.7823	0.9375	110.86	
Alkylate	Jul	66.53	58.63	74.43	51.98	3.3803	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.1566	0.0529	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.4034	N/A	N/A	92.1300	0.0612	0.0116	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.1775	N/A	N/A	67.2823	0.7823	0.9354	110.86	
Alkylate	Aug	65.15	57.72	72.57	51.98	3.2865	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.1566	0.0524	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.3868	N/A	N/A	92.1300	0.0612	0.0115	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.0636	N/A	N/A	67.3020	0.7823	0.9362	110.86	
Alkylate	Sep	59.98	52.93	67.04	51.98	2.9554	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.1566	0.0503	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.3300	N/A	N/A	92.1300	0.0612	0.0109	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.6607	N/A	N/A	67.3751	0.7823	0.9388	110.86	
Alkylate	Oct	54.07	48.01	60.13	51.98	2.6101	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.1566	0.0479	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.2738	N/A	N/A	92.1300	0.0612	0.0102	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.2395	N/A	N/A	67.4579	0.7823	0.9419	110.86	
Alkylate	Nov	48.04	43.61	52.46	51.98	2.2925	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3

2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.1566	0.0455	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.2250	N/A	N/A	92.1300	0.0612	0.0096	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.8510	N/A	N/A	67.5410	0.7823	0.9449	110.86	
Alkylate	Dec	42.89	39.34	46.44	51.98	2.0474	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.1566	0.0434	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.1895	N/A	N/A	92.1300	0.0612	0.0090	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.5505	N/A	N/A	67.6108	0.7823	0.9475	110.86	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

331 (Incremental) - Internal Floating Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	12.8733	13.8975	15.2654	16.7928	18.6937	21.0058	23.0276	22.2853	19.7189	17.1314	14.8264	13.0943
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Value of Vapor Pressure Function:	0.0434	0.0468	0.0515	0.0566	0.0630	0.0708	0.0776	0.0751	0.0665	0.0577	0.0500	0.0441
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.0157	2.1617	2.3537	2.5641	2.8200	3.1229	3.3803	3.2865	2.9554	2.6101	2.2925	2.0474
Tank Diameter (ft):	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149
Number of Columns:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Effective Column Diameter (ft):	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
Net Throughput (gal/mo.):	5,799.5000	5,799.5000	5,799.5000	5,799.5000	5,799.5000	5,799.5000	5,799.5000	5,799.5000	5,799.5000	5,799.5000	5,799.5000	5,799.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000
Tank Diameter (ft):	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000
Deck Fitting Losses (lb):	56.2084	60.6802	66.6531	73.3222	81.6217	91.7174	100.5448	97.3037	86.0983	74.8007	64.7362	57.1733
Value of Vapor Pressure Function:	0.0434	0.0468	0.0515	0.0566	0.0630	0.0708	0.0776	0.0751	0.0665	0.0577	0.0500	0.0441
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	69.0966	74.5926	81.9334	90.1299	100.3303	112.7381	123.5873	119.6039	105.8321	91.9470	79.5775	70.2824

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Column Well (24-in. Diam.)/Pipe Col.-Sliding Cover, Gask.	1	25.00	0.00	0.00	101.1938
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00	0.00	307.6293
Roof Leg or Hanger Well/Fixed	20	0.00	0.00	0.00	0.0000
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	25.0961
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	17.4053
Access Hatch (24-in. Diam.)/Unbolted Cover, Gasketed	1	31.00	5.20	1.30	125.4804
Stub Drain (1-inch diameter)/Stub Drain (1-inch diameter)	59	1.20	0.00	0.00	286.5810
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	48.5730

TANKS 4.0.9d

Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

331 (Incremental) - Internal Floating Roof Tank
Salt Lake City, Utah

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Alkylate	208.61	0.18	910.86	0.00	1,119.65
2,2,4-Trimethylpentane (isooctane)	10.12	0.03	44.17	0.00	54.32
Toluene	2.17	0.01	9.47	0.00	11.65
Unidentified Components	196.33	0.14	857.21	0.00	1,053.68

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	503
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	Ethanol
Tank Dimensions	
Diameter (ft):	38.00
Volume (gallons):	300,000.00
Turnovers:	37.15
Self Supp. Roof? (y/n):	N
No. of Columns:	1.00
Eff. Col. Diam. (ft):	2.00
Paint Characteristics	
Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good
Rim-Seal System	
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted
Deck Characteristics	
Deck Fitting Category:	Detail
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

TANKS 4.0.9d
Emissions Report - Detail Format

Liquid Contents of Storage Tank

503 - Internal Floating Roof Tank
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Denatured Fuel Ethanol	Jan	42.19	38.38	46.01	51.98	1.2435	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Feb	45.35	40.84	49.87	51.98	1.3387	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Mar	49.25	43.96	54.55	51.98	1.4644	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Apr	53.24	46.98	59.49	51.98	1.6027	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	May	57.74	50.54	64.93	51.98	1.7719	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Jun	62.65	54.94	70.36	51.98	1.9731	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Jul	66.53	58.63	74.43	51.98	2.1450	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Aug	65.15	57.72	72.57	51.98	2.0824	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Sep	59.98	52.93	67.04	51.98	1.8617	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Oct	54.07	48.01	60.13	51.98	1.6331	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Nov	48.04	43.61	52.46	51.98	1.4243	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Dec	42.89	39.34	46.44	51.98	1.2641	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

503 - Internal Floating Roof Tank
Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	2.3083	2.4951	2.7443	3.0216	3.3655	3.7815	4.1429	4.0105	3.5503	3.0830	2.6644	2.3486
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Value of Vapor Pressure Function:	0.0259	0.0280	0.0308	0.0339	0.0377	0.0424	0.0464	0.0450	0.0398	0.0346	0.0299	0.0263
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.2435	1.3387	1.4644	1.6027	1.7719	1.9731	2.1450	2.0824	1.8617	1.6331	1.4243	1.2641
Tank Diameter (ft):	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000
Vapor Molecular Weight (lb/lb-mole):	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	5.7051	5.7051	5.7051	5.7051	5.7051	5.7051	5.7051	5.7051	5.7051	5.7051	5.7051	5.7051
Number of Columns:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Effective Column Diameter (ft):	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
Net Throughput (gal/mo.):	928,742.5000	928,742.5000	928,742.5000	928,742.5000	928,742.5000	928,742.5000	928,742.5000	928,742.5000	928,742.5000	928,742.5000	928,742.5000	928,742.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845
Tank Diameter (ft):	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000
Deck Fitting Losses (lb):	8.9699	9.6961	10.6641	11.7420	13.0782	14.6947	16.0993	15.5846	13.7963	11.9805	10.3537	9.1267
Value of Vapor Pressure Function:	0.0259	0.0280	0.0308	0.0339	0.0377	0.0424	0.0464	0.0450	0.0398	0.0346	0.0299	0.0263
Vapor Molecular Weight (lb/lb-mole):	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000
Vapor Molecular Weight (lb/lb-mole):	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	16.9834	17.8963	19.1135	20.4688	22.1489	24.1814	25.9474	25.3002	23.0517	20.7686	18.7232	17.1805

Roof Fitting/Status	Quantity	KFa(lb-mole/yr)	Roof Fitting Loss Factors KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	2.6359
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	92.2562
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	51.0704

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

503 - Internal Floating Roof Tank
Salt Lake City, Utah

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Denatured Fuel Ethanol	37.52	68.46	145.79	0.00	251.76

Attachment C

EPA Guidance on NSR Project Aggregation

Prior to 2006, EPA's aggregation policy was not spelled out but involved the application of "common sense factors to determine the relatedness of projects for purposes of aggregation." The policy had evolved in large part based on "specific, case-by-case after-the-fact inquiries related to the possible circumvention of NSR in existing permits."[27]

In 2006, EPA announced its intention to promulgate a rule on aggregation that would clarify the previous policy.[28] The rule would have EPA aggregate projects only if they were not independent of each other. There would be no aggregation based on time. Specifically, the agency proposed that when a particular project is technically or economically dependent upon another project, the emissions resulting from each of the projects must be added together for purposes of determining NSR applicability.[29] The terms ''technically dependent'' and ''technical dependence'' describe the interrelationship between projects such that one project is incapable of performing as planned in the absence of the other project. This means that, absent another project, the process change cannot operate without significant impairment, or for the planned amount of hours, or at the planned rating or production level, or that it operates in a manner that results in a product of inferior quality. Activities are dependent on each other for their economic viability if the economic revenues or ''Return on Investment'' associated with the project could not be realized without the completion of another project. EPA proposed an approach that would require that a source treat one project as economically dependent on another if it is no longer economically viable without the completion of the other project(s).[30] Economic viability is measured by assessing the ROI or payback of a project, such that a project is not economically viable if it does not pay for itself (e.g., yield a positive expected rate of return) in the absence of another related project.

EPA finalized the aggregation rule in 2009 and it did not make any changes to the rule language relevant to aggregation, but interpreted that rule text to mean that sources and permitting authorities should combine emissions only when nominally separate changes are "substantially related."[31] EPA described in the final rule preamble the factors that may be considered when evaluating whether changes are substantially related, and specifically stated that two nominally-separate changes are not substantially related if they are only related to the extent that they both support the plant's overall

[27] 71 Fed Reg 54244.

[28] 71 Fed Reg 54235.

[29] 71 Fed Reg 54245.

[30] 71 Fed Reg 54246.

[31] 74 Fed Reg 2376.

basic purpose. At the same time, EPA adopted a rebuttable presumption that nominally-separate changes at a source that occur three or more years apart are presumed to not be substantially related.[32]

On May 6, 2010 the EPA administrator signed a stay of effectiveness of the aggregation rule until the judicial review are completed or EPA completes its reconsideration process. Therefore, at this time the final aggregation rule remains stayed and EPA's prior policy related to aggregation/circumvention remains the effective basis for determination.

***Pre-2006 EPA Policy: 3M-Maplewood Memo*.** While numerous EPA opinion letters wove the fabric for EPA's "specific, case-by-case after-the-fact inquiries" on aggregation prior to 2006, EPA's opinion letter to 3M regarding the company's facility in Maplewood, Minnesota is often cited for its general statement of EPA's position on aggregation principles.[33,34] In the 3M-Maplewood Memo, EPA indicated that projects should be aggregated where standing alone, they are not economically or technically viable. EPA enumerated the following five criteria for evaluation of this issue:

(1) Filing of more than one minor source or minor modification application associated with emissions increases at a single plant within a short time period.

(2) Applications for commercial loans . . . to see if the source has treated the projects as one modification for financial purposes.

(3) Reports of consumer demand and projected production levels.

(4) Statements of authorized representatives of the source regarding plans for operation. And,

(5) EPA's own analysis of the economic realities of the projects considered together.

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[32] 74 Fed Reg 2376.

[33] See "Applicability of New Source Review Circumvention Guidance to 3M-Maplewood, Minnesota" (EPA, June 17, 1993) ("3M-Maplewood Memo")

[34] In 3M's case, the company received four synthetic minor permits for modifications between October 1991 and March 1992, each project which 3M argued was decided for by "independent divisions" at the plant, and, further, that each project was "independently viable."

Most of these factors are aimed at evaluating the applicant's intent and the economic realities surrounding a project. For instance, where it appears obvious that a proposed source or modification, by its physical and operational design characteristics, could not economically be run at minor source levels for an appreciable length of time without modifications included in the second proposed project, aggregation may be appropriate.

EPA's policy statements in the context of the related issue of unlawful circumvention are also helpful in reviewing its interpretive approach to aggregation, and the importance that a source's intent, as established by objective indicia, occupies in the analysis:[35]

> It is not possible to set forth, in detail, the circumstances in which EPA considers an owner or operator to have evaded preconstruction review . . . and thus subjected itself to enforcement sanctions under [Clean Air Act] sections 113 and 167 from the beginning of construction. This is ultimately a question of intent.

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[35] 54 Fed. Reg. 27,274, 27,274

Attachment D

Letter from EPA Region 4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

MAR 1 8 2010

Mark Robinson
Plant Manager
Georgia-Pacific Wood Products LLC
Highway 13 North
Columbia, Mississippi 39429

Dear Mr. Robinson,

On December 1, 2009, the Mississippi Department of Environmental Quality (MDEQ) forwarded to the Environmental Protection Agency (EPA) your 502(b)(10) change request dated November 16, 2009. Please note that Mississippi regulations at APC-S-6 Section IV.F require that facilities provide EPA as well as MDEQ with written notification in advance of the proposed changes. In the future, you must provide EPA with a copy of any 502(b)(10) changes.

On December 2, 2009, EPA notified MDEQ via e-mail about concerns regarding Georgia Pacific's use of the "demand growth exclusion" in 40 CFR 52.21(b)(41)(ii)(*c*) and whether the "Vortex Burners" project qualified as a 502(b)(10) change. On December 14, 2009, representatives from Georgia Pacific met with EPA Region 4 to discuss the 502(b)(10) change request and provided additional information regarding the project.

After further review and consideration, and contingent on the information submitted being accurate and complete, EPA acknowledges that Georgia Pacific's use of the "demand growth exclusion" for calculating applicability of the Prevention of Significant Deterioration (PSD) permitting requirements is adequate and the project does qualify as a 502(b)(10) change. However, we have some points of clarification regarding statements made on the 502(b)(10) change request letter.

We acknowledge that Georgia Pacific may use the highest demonstrated average monthly operating level during the baseline period as an approximation of the level of operation that the units "could have accommodated" during the baseline period. However, EPA disagrees with the statement that Georgia Pacific "…does not accept this as the limit on excludable emissions during the baseline…" and the statement that the excludable amount under the "demand growth exclusion" is "…the highest amount that the unit could have legally and physically emitted during the baseline…" For PSD applicability purposes, the concept of emissions that "could have been accommodated" is relevant only in conjunction with the source's calculation of "projected actual emissions." That is, once the projected actual emissions from the source following the proposed project have been determined, the source may exclude from the projection "that portion of the unit's emissions following the project that an existing unit could have accommodated" during the baseline period, and "that are also unrelated to the particular project." See 40 CFR 52.21(b)(41)(ii)(*c*). Accordingly, before any given emissions may be excluded under 40 CFR 52.21(b)(41)(ii)(*c*) on the basis that they result from future demand growth, those emissions must first be part of the projected actual emissions based on "all relevant information" [see e.g., 40 CFR 52.21(b)(41)(ii)(*a*)] used to make the emissions projection.

In summary, although we do not agree with some of the statements made by Georgia Pacific in the 502(b)(10) change request as explained above, based on the information submitted, we agree with Georgia Pacific's use of the "demand growth exclusion" for determining PSD applicability for the "Vortex Burners" project. Since the "Vortex Burners" project is not considered a Title I modification, and does not exceed emissions allowable under the permit, the change qualifies as a 502(b)(10) change. If you have any questions, you may contact Heather Abrams at (404) 562-9185 or Yolanda Adams at (404) 562-9214.

Sincerely,

Gregg M. Worley

Gregg M. Worley
Chief
Air Permits Section

Enclosures

1. Letter dated November 16, 2009
2. Example VOC Emissions for Kiln 2 and 3

cc: Mr. Scott Hodges – MDEQ
Ms. Maria Zufall – Georgia-Pacific

#-1639

Georgia-Pacific

Georgia-Pacific Wood Products LLC
Highway 13 North
Columbia, Mississippi 39429
Telephone (601) 736-7181

November 16, 2009

Mr. Scott Hodges
Mississippi Department of Environmental Quality
Environmental Permits Division
P. O. Box 2261
Jackson, MS 39225

RECEIVED
NOV 24 2009
Dept of Environmental Quality
Office of Pollution Control

Re: Georgia-Pacific Wood Products LLC
Columbia, MS Sawmill
Facility No. 1740-00008

Dear Mr. Hodges:

Georgia-Pacific Wood Products LLC owns and operates the Columbia, Mississippi Chip-N-Saw (CNS). The Columbia CNS (Facility No. 1740-00008) operates under a Title V Major Source Operating Permit issued by the Mississippi Department of Environmental Quality (MDEQ). The Columbia CNS is submitting this letter to notify MDEQ of a 502(b)(10) change for a project to install a vortex chamber system on Kiln No. 2. The Columbia CNS anticipates making this change to Kiln No. 2 on or about December 15, 2009. A 502(b)(10) notification was submitted to MDEQ in November 2008 for the Kiln No. 3 vortex chamber, and that work was completed in March of 2009. Since the time of the November 2008 submittal, additional information has been developed regarding the Kiln No. 3 vortex chamber. This letter addresses the vortex chambers for both kilns.

As described in this letter, the project (vortex chambers for both Kiln 2 and 3) is exempt from construction permitting requirements because it is a *de minimis* NSR modification as defined by Mississippi's "Permit Regulation for the Construction and/or Operation of Air Emissions Equipment (APC-S-2)." The project qualifies as a 502(b)(10) change under the operational flexibility provisions of Mississippi's Title V regulation (APC-S-6) because the project does not constitute a Title I modification, does not exceed an allowable emission rate, and does not violate applicable requirements or contravene federally enforceable permit terms and conditions that are monitoring, recordkeeping, reporting, or compliance certification requirements.

The remainder of this letter provides a brief description of the project and applicability of permitting and regulatory requirements.

PROJECT DESCRIPTION AND EMISSIONS CHANGES

The Columbia CNS has three kilns that are heated by direct-fired dry shavings burners. The projects involve installing a secondary combustion "vortex" chamber on the burner for Kiln No. 2 and No. 3 to reduce energy costs and improve lumber quality. The additional combustion chamber also minimizes the risks of a kiln fire due to carryover. A 502(b)(10) letter for Kiln No. 3 was submitted to MDEQ in November 2008 and the vortex chamber was installed in March 2009. At the time of the November 2008 submittal, there was nothing in the project scope or engineering design to indicate that an increase in production could result from installation of the vortex chamber. Now that the plant has operated for a number of months with the vortex chamber on Kiln No. 3, it has been determined that the kiln cycle time can be reduced from an average of 19 hours to 17.5 hours by utilizing the retained heat in the vortex chamber if the lumber kiln is immediately re-loaded ("hot-charged"). Therefore, we have evaluated the emissions increase from reducing the cycle time for both Kiln Nos. 2 and 3.

For determining applicability of PSD permitting to the project, GP calculated emissions increases based on 40 CFR §52.21, which is incorporated by reference (with exceptions noted) in MDEQ regulation APC-S-5. Emissions increases (EI) for an existing unit are determined from:

EI = Projected Actual Emissions (PAE) – Baseline Actual Emissions (BAE)

The baseline actual emissions are based on emissions from 2004-2005, the highest two calendar years of production (and therefore emissions) in the past 10 years. Emissions are calculated using actual stack test data, NCASI and EPA emission factors. Detailed calculations are included in the attachment to this letter.

For the modified units, Kiln Nos. 2 and 3, the projected actual emissions were estimated based on the highest monthly throughput (annualized) for the two kilns during the baseline period, 105,816 thousand board feet per year (Mbf/yr) plus the increased throughput due to decreased cycle time. The maximum monthly throughput (annualized) was used a basis for the projected maximum emissions because future production is expected to be no greater than the existing maximum other than the change due to the vortex project. The increase due to cycle time change was calculated as a percent increase based on 19 hours before installation of the vortex chamber and 17.5 hours with the vortex chamber. The projected actual production for Kiln Nos. 2 and 3 is calculated as 105,816 Mbf/yr * 19/17.5 = 114,886 Mbf/yr.

Per 40 CFR §52.21(b)(41)(ii)(c), the projected actual emissions:

> *Shall exclude, in calculating any increase in emissions that results from the particular project, that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month period used to establish the baseline actual emissions under subparagraph (2)(uu) of this rule and that are not resulting from the particular project, including any increased utilization due to product demand growth;*

This provision is commonly called the "demand growth exclusion". The amount of excludable emissions is difficult to assess, and the rules contain no specific assessment guidance, but GP believes that the excludable amount essentially is the level of emissions that could be physically and legally accommodated by the unit during the baseline period, before (without) any increases caused by the physical or operational changes proposed in the project. The rules do not limit this excludable amount to the amount actually emitted (i.e., the highest demonstrated/documented level of emissions) during a given period within the baseline. Rather, it is the highest amount that the unit could have legally and physically emitted during the baseline, before the proposed project, if market demand had been sufficiently high to require that increased maximum level of production.

For convenience and simplicity only, GP used the highest demonstrated average monthly operating level[1] during the baseline period as an approximation of the level of operation that the Kiln Nos. 2 and 3 "could have accommodated" during the baseline period. Emissions that the unit could have accommodated during the baseline, including those caused by increased utilization stimulated by "demand growth", are subtracted from the calculated projected actual emissions.

As the kilns are typically the production bottleneck at the facility, emissions increases from affected sources were also calculated for all process emission units with the exception of Kiln No. 1. To determine the impact of the additional board production (9,070 Mbf/yr), the increase in Mbf was converted to increases in hours, log, and truck throughput based on ratio of Mbf to each production parameter during the baseline period.

Based on the methodology described above, the following emission increases are calculated for the vortex chamber projects, demonstrating that neither PSD nor state permitting is required for any pollutant.

[1] The 30-day period as a demonstration of "could have accommodated" emissions has been presented by EPA Region 4 as an acceptable approximation (Southern Section AWMA Presentation by Jim Little, August 22, 2006). GP does not accept this as the limit on excludable emissions during the baseline as there are no such limits in the rule, but uses it here for convenience because it seems to be an accepted, demonstrated approach.

Table 1. Emissions Increase due to Vortex Burners

	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	NO_X (tpy)	CO (tpy)	VOC (tpy)	SO_2 (tpy)
Kiln 2 and 3							
A. Baseline	34.0	34.0	34.0	19.9	83.6	211.6	3.0
B. Capable of Accommodating	41.3	41.3	41.3	24.2	101.6	257.1	3.6
C. Projected Actual	44.8	44.8	44.8	26.3	110.3	279.2	3.9
D. Demand Growth (D = B - A)	7.3	7.3	7.3	4.3	18.0	45.5	0.6
E. Emission Increase (E = C - A - D)	3.5	3.5	3.5	2.1	8.7	22.0	0.3
Affected Sources - Incremental Increase	8.3	3.2	1.6				
Project Increase	11.8	6.8	5.1	2.1	8.7	22.0	0.3
PSD SER	**25**	**15**	**10**	**40**	**100**	**40**	**40**
Exceeds?	No	No	No	No	No	No	No
MDEQ De Minimis	**18.8**	**11.3**	**7.5**	**30.0**	**75.0**	**30.0**	**30.0**
Exceeds?	No	No	No	No	No	No	No

Regulatory Applicability Analysis

There are no New Source Performance Standards (NSPS) that specifically apply to sawmills. In addition, no emission units proposed for modification are defined as affected facilities under any NSPS. Therefore, no NSPS apply to this project.

A National Emissions Standard for Hazardous Air Pollutants (NESHAP) for the plywood and composite wood products (PCWP) source category, commonly known as the PCWP MACT, was initially finalized by U.S. EPA on July 30, 2004 and was reissued and amended after reconsideration on February 16, 2006. The rule was partially vacated and remanded by the D.C. Circuit Court of Appeals in June 2007. Lumber kilns are process units within the "affected source" under the PCWP MACT. However, there are no applicable control requirements or work practice standards. Therefore, GP was only required to submit an initial notification as required under NESHAP Subpart A (40 CFR §63.9). No other emission units proposed for modification are process units within the affected source under the PCWP MACT.

The equipment at the Columbia CNS will continue to be operated in compliance with applicable requirements of Mississippi's "Air Emission Regulations for the Prevention, Abatement, and Control of Air Contaminants (APC-S-1)." There is no change to the applicability or requirements of these regulations as a result of the vortex chamber projects.

Permitting Applicability Analysis

The Columbia CNS's current Title V Operating Permit limits the kilns to 160,000 Mbf/yr (combined), 2.4 lbs of sulfur dioxide (SO_2) per MMBtu and firing of woodwaste only. The CNS will continue to meet these requirements after the proposed project. Therefore, the installation of the vortex chamber will not result in an exceedance of an allowable emission rate, violate applicable requirements, or contravene federally enforceable permit terms and conditions that are monitoring, recordkeeping, reporting, or compliance certification requirements.

Regulation APC-S-2 describes requirements for construction permits. The emissions increases from the proposed project are shown in Table _. The increases were compared to both the Prevention of Significant Deterioration (PSD) significant emission rates (SER) and MDEQ's *de minimis* modification threshold (equal to 75% of the PSD SER). The project emission increases are below both the major modification thresholds and the *de minimis* thresholds. Therefore, the project is not a major modification, does not require an emissions netting analysis, and is not a moderate (i.e., synthetic minor) modification. Section XIII(F) provides that "a *de minimis* NSR modification is excluded from the requirements for a permit to construct. This does not eliminate any requirement for modification of Title V permits or permits to operate for *de minimis* modifications."

The Columbia CNS permit has an existing requirement to (Condition 5.B.1) to record the lumber throughput on a daily and rolling 365-day basis and is required to report annual facility-wide emissions per Condition 1.7. As such the Columbia CNS requests that the existing monitoring requirements be accepted as meeting the recordkeeping requirements of 52.21(r)(6).

Regulation APC-S-6 describes requirements for Title V operating permits. Section IV.F of this regulation addresses changes that may be made without requiring a permit revision. These changes are commonly referred to as "operational flexibility" or 502(b)(10) changes that "are not modifications under any provision of Title I of the Act and the changes do not exceed the emissions allowable under the permit." This project meets these criteria as described in this letter because the project is not a major modification with respect to PSD and does not trigger applicable requirements as a modification under NSPS or NESHAP.

<u>SUMMARY</u>

The modification described in this letter does not constitute a Title I modification and does not exceed a permitted, allowable emission rate. This modification does not violate applicable requirements or contravene federally enforceable permit terms and conditions that are monitoring, recordkeeping, reporting, or compliance certification requirements. Further, GP understands that a permit shield will not be extended to this modification.

GP appreciates your prompt review of the proposed 502(b)(10) change described in this letter and respectfully requests your written concurrence with the permitting conclusions discussed herein. Please do not hesitate to contact Maria Zufall at 404.652.7256 or Forrest Denney at 404.652.4831 to discuss any questions and comments or if any additional information is required.

CERTIFICATION

The undersigned certifies under the penalty of law, that all information and statements provided in this request, based on information and belief formed after reasonable inquiry, are true, accurate, and complete.

Sincerely,

Mark Robinson

Mark Robinson
Plant Manager

cc: Mr. Forrest Denney

Attachment

ATTACHMENT

Emission Calculations

Emissions Summary

	PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	NO_X (tpy)	CO (tpy)	VOC (tpy)	SO_2 (tpy)
Kiln 2 and 3							
A. Baseline	34.0	34.0	34.0	19.9	83.6	211.6	3.0
B. Capable of Accommodating	41.3	41.3	41.3	24.2	101.6	257.1	3.6
C. Projected Actual	44.8	44.8	44.8	26.3	110.3	279.2	3.9
D. Demand Growth (D = B - A)	7.3	7.3	7.3	4.3	18.0	45.5	0.6
E. Emission Increase (E = C - A - D)	3.5	3.5	3.5	2.1	8.7	22.0	0.3
Affected Sources - Incremental Increase							
Planer Mill Cyclone	0.8	0.8	0.8				
Shavings Truck Bin Cyclone	7.5E-03	7.5E-03	7.5E-03				
Fuel Bin Cyclone	0.2	0.2	0.2				
Deck Saw	4.3E-02	1.5E-02	1.5E-02				
Debarkers	0.5	0.2	0.2				
Bark Hog	5.1E-02	2.3E-02	2.3E-02				
Lillypad Chipper	4.9E-03	2.3E-03	2.3E-03				
Green Chipper	3.4E-02	1.5E-02	1.5E-02				
Shaker Screen	0.2	0.1	0.1				
Drop Points	2.4E-02	1.1E-02	1.7E-03				
Roads	6.5	1.8	0.2				
Project Increase	11.8	6.8	5.1	2.1	8.7	22.0	0.3
PSD SER	**25**	**15**	**10**	**40**	**100**	**40**	**40**
Exceeds?	**No**	**No**	**No**	**No**	**No**	**No**	**No**
MDEQ De Minimis	**18.8**	**11.3**	**7.5**	**30.0**	**75.0**	**30.0**	**30.0**
Exceeds?	**No**	**No**	**No**	**No**	**No**	**No**	**No**

1. For sources without $PM_{2.5}$ data, it is assumed equal to PM_{10}. For sources without PM_{10} data, assumed equal to PM.

Project Details

Production ratio due to project	1.09	
Kiln 2 and 3 Capable of Accommodating	105,816	Mbf/yr
Kiln 2 and 3 Future Actual	114,886	Mbf/yr
Increased Production	9,070	Mbf/yr

1. Production ratio calculated based on decrease in cycle time for the kilns. Equal to current average cycle time of 19 hours divided by future average cycle time of 17.5 hours.
2. Kiln 2 and 3 capable of accommodating calculated from highest production month during baseline period (March 2004).
3. Kiln future actual based on highest production month during baseline period and percent increase due to reduction in kiln cycle time. Value is consistent with a the combined kiln permit limit 160,000 Mbf/yr limit and with 70% of capacity for Kilns 2 and 3.

Production Data

Parameter	Units	2004	2005	2004-2005 Average	Parameter per Mbf	Increase Due to Project	Potential	Reference
Logs	tpy	576,387	534,045	555,216	4.48	40,634	1,735,487	1, 2
Bark generated	tpy	58,864	54,540	56,702	0.46	4,150	173,549	1, 3
Lillypads	tpy	5,835	5,406	5,621	4.54E-02	411	17,355	1, 4
Sawdust generated	tpy	1,225	1,135	1,180	0.01	86	112,128	1, 2
Chips generated	tpy	197,906	186,779	192,343	1.55	14,077	627,216	1, 2
Kiln Production - All	Mbf/year	135,159	112,701	123,930	1.00	9,070	160,000	1, 5
Kiln Production - 2&3 Only	Mbf/year	90,431	83,740	87,086	0.70	6,373		1
Dry Shavings Generated	tpy	5,852	4,402	5,127	0.04	375	36,704	1, 2
Fuel Silo Throughput	tpy	17,078	18,298	17,688	0.14	1,295		1
Planer Hours	hours	5,219	5,197	5,208	0.04	381	8,760	1
Truck Bin Hours	hours	1,923	1,008	1,466	0.01	107	8,760	1
Fuel Storage Hours	hours	3,296	4,189	3,743	0.03	274	8,760	1
Finished Lumber Trucks	No./year	3,490	4,521	4,006	0.03	293		1
1" Rough Green Lumber Trucks	No./year	366	404	385	3.11E-03	28		1
Block Trucks	No./year	145	125	135	1.09E-03	10		1

1. Actual throughput data per annual emission inventories and monthly kiln data.
   Increase due to project calculated based on past actual ratio of each parameter to Mbf and increase in Mbf due to project.
2. Potential throughput per 2008 Title V application. Calculated from ratio of maximum to actual board processing and actual process throughput for 2007.
3. Potential estimated as 10% of log throughput.
4. Potential estimated as 1% of log throughput.
5. Potential throughput per Title V permit limit, Condition 3.B.3

Production Data

Parameter	Past Actual	Increase in hours due to project
Planer Hours	5,208	381
Truck Bin Hours	1,466	107
Fuel Storage Hours	3,743	274

Planer Mill Cyclone Test Data

Test Date	PM Test Value (lb/hr)
October 2, 2003	3.14
January 30, 2006	3.68
October 11, 2007	2.65
Average + 2 Std. Deviations	4.19

Cyclone Emissions

Unit	ID	Past Actual PM Emission Factor (lb/hr)	Future PM Emission Factor (lb/hr)	Past Actual Emissions (tpy)	Emission Increase (tpy)
Planer Mill Cyclone	AA-001	3.14	4.19	8.2	0.8
Shavings Truck Bin Cyclone	AA-002	0.14	0.14	0.1	0.01
Fuel Bin Cyclone	AA-003	1.62	1.62	3.0	0.2

1. Emission factors are based on test data. PM is assumed equal to PM_{10} and $PM_{2.5}$.
   Past actual planer mill cyclone test data based test data for 2003, as this value would be used for 2004-05 emissions.
   Increase emissin factor based on average plus 2 standard deviations of test data.
   Shavings truck bin cyclone test data from September 30, 2003.
   Fuel bin cyclone test data from September 30, 2003.
2. Emissions calculated from lb/hr and hours per year.

Production Data (Kiln 2 and 3 only)

Parameter	Past Actual	Future Actual	Capable of Accommodating
Kiln Throughput (Mbf/yr)	87,086	114,886	105,816
Heat Input (MMBtu/yr)	239,486	315,937	290,994

1. Heat input estimated from 2.75 MMBtu/Mbf
2. Capable of accommodating equal to maximum month (March 2004) annualized to one year.

Criteria Pollutant Emission Calculations

Pollutant	Emission Factors (lb/MMBtu)	Emission Factors (lb/mbf)	Past Actual Emission Rates[1] (tpy)	Future Actual Emission Rates[1] (tpy)	Capable of Accommodating (tpy)
PM(f+C)[2]	-	0.78	34.0	44.8	41.3
NO_X[3]		0.458	19.9	26.3	24.2
SO_2[4]	0.025	-	3.0	3.9	3.6
CO[5]	-	1.92	83.6	110.3	101.6
VOC[6]	-	4.86	211.6	279.2	257.1

1. For SO_2: Emission Rates (lb/hr) = Emission Factor (lb/MMBtu) * Fuel Usage (ton/yr) * Fuel Heat Content (Btu/lb) / Hours of Operation (hr/yr) * (2,000 lb/ton) * (MMBtu/10^6 Btu)
Emission Rates (tpy) = Emission Factor (lb/MMBtu) * Fuel Usage (ton/yr) * Fuel Heat Content (Btu/lb) * (MMBtu/10^6 Btu)
For all other pollutants: Emission Rates (lb/hr) = Emission Factor (lb/mbf) * Production Rate (mbf/yr) / Hours of Operation (hr/yr)
Emission Rates (tpy) = Emission Factor (lb/mbf) * Production Rate (mbf/yr) * (ton/2,000 lb)
2. Georgia Pacific Title V Factors, average plus 2 standard deviations. Includes filterable and condensable.
3. Stack test data for similar facility (Idabel, 1996) plus 20% safety factor.
4. Emission factors from AP-42 Section 1.6 Wood Residue Combustion in Boilers (9/2003).
5. Georgia Pacific Title V Factors, average plus 2 standard deviations.
6. Calculated from the wood products protocol method plus a 20% safety factor.

Log and Saw Parameters

Log Length	40	ft/log
Log Diameter	0.92	ft
Density	58	lb/ft^3
Saw Kerf Width	0.504	inches
No. Cuts per log	2	cuts/log

Deck Saw Emissions (F-001)

	Log Throughput (tpy)	Log Length[1] (feet/yr)	No. Logs[2]	Sawdust[3] (tpy)	Emission Factor (lb/ton)[4] PM	Emission Factor (lb/ton)[4] PM_{10}	PM Emissions[5] (tpy)	PM_{10} Emissions[5] (tpy)
Past Actual	555,216	29,010,233	725,256	1,166	1.0	0.36	0.58	0.21
Increase	40,634	2,123,146	53,079	85	1.0	0.36	0.04	0.02

1. Log length calculated from log throughput (tpy) / density (lb/ft^3) / area (ft^2) * 2000 lb/ton.
2. Number of logs calculated from total log length (ft/yr) / individual log length (ft)
3. Sawdust calculated from No. logs per year * No. cuts (cuts/log) * log area (ft^2) * kerf width (ft) * density (lb/ft^3)/2000.
4. Emission factor based on the FIRE database for SCC 3-07-008-03 for sawdust storage pile handling.
   Emissions assumed similar since sawing is creating sawdust.
5. Annual emissions calculated from emission factor (lb/ton) * sawdust (tpy) / 2000 (lb/ton).

Debarker, Hog, and Chipper Emission Calculations (FS-002, FS-003, FS-004, FS-005)

Unit	Throughput Past Actual (tpy)	Throughput Increase (tpy)	PM Emissions Past Actual (tpy)	PM Emissions Increase (tpy)	PM_{10} Emissions Past Actual (tpy)	PM_{10} Emissions Increase (tpy)
F-002 Debarkers	555,216	40,634	6.66	0.5	3.05	0.22
F-003 Bark Hog	57,882	4,236	0.69	0.05	0.32	0.02
F-004 Lillypad Chipper	5,621	411	6.74E-02	4.94E-03	3.09E-02	2.26E-03
F-005 Green Chipper	38,469	2,815	0.46	0.03	0.21	0.02
IS - Shaker Screen	193,523	14,163	2.32	0.17	1.06	0.08

1. Debarker throughput based on total logs. Bark Hog throughput based and bark plus sawdust.
   Lillypad Chipper throughput based on lillypad throughput (0.1% of logs). Green chipper throughput based on 20% of chip production
   Shaker screen throughput equal to chips plus sawdust.
2. Emission factor per FIRE database, SCC Code 3-07-008-01, Log Debarking.

PM	0.024	lb/ton of logs processed
PM_{10}	0.011	lb/ton of logs processed

Emission Factor Calculation

Material	Moisture Content[1]	Emission Factor (lb/ton)[2,3] PM	PM_{10}	$PM_{2.5}$
All	4.8	1.19E-03	5.63E-04	8.52E-05

1. Moisture content (M) for f set equal to the maximum value for which the equation is appropriate. Actual moisture content is higher.

2. Emission factor calculated from
   where:

$$E\ (\text{lb/ton}) = k \times 0.0032 \times \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

k: Particle size multiplier
0.74 PM
0.35 PM_{10}
0.053 $PM_{2.5}$

U: Mean wind speed 7.558 mph

3. Emission factor per AP-42, Section 13.2.4, *Aggregate Handling and Storage Piles*, drop equation. Mean wind speed for Baton Rouge, LA per EPA TANKS meteorological database.

Emissions Calculation

Material	No. Drop Points	Throughput (tpy) Past Actual	Throughput (tpy) Increase	PM Emissions (tpy) Past Actual	PM Emissions (tpy) Increase	PM_{10} Emissions (tpy) Past Actual	PM_{10} Emissions (tpy) Increase	$PM_{2.5}$ Emissions (tpy) Past Actual	$PM_{2.5}$ Emissions (tpy) Increase
Sawdust/Bark Bin	2	57,882	4,236	6.88E-02	5.04E-03	3.26E-02	2.38E-03	4.93E-03	3.61E-04
Green Chip Loading	2	192,343	14,077	2.29E-01	1.67E-02	1.08E-01	7.92E-03	1.64E-02	1.20E-03
Dry Shavings Loading	2	5,127	375	6.10E-03	4.46E-04	2.88E-03	2.11E-04	4.37E-04	3.20E-05
Fuel Silo Loading	2	17,688	1,295	2.10E-02	1.54E-03	9.95E-03	7.28E-04	1.51E-03	1.10E-04
Total				0.32	0.02	0.15	0.01	0.02	1.70E-03

Road Emissions (F-006)

Average Through Traffic:	Past Actual	Increase	Units
Shavings Trucks (Unpaved Road)			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.8	0.8	miles/trip
Unloaded vehicle weight:	13.3	14.5	tons/truck
Loaded vehicle weight, (approx.):	41.5	41.5	tons/truck
Material Throughput	5,127	375	tons/yr
Total number of trucks:	182	14	trucks/yr
Vehicle miles traveled (VMT):	145	11	miles/yr
Chip Trucks (Unpaved Road)			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.8	0.8	miles/trip
Unloaded vehicle weight:	13.3	14.5	tons/truck
Loaded vehicle weight, (approx.):	41.5	41.5	tons/truck
Material Throughput	192,343	14,077	tons/yr
Total number of trucks:	6,821	521	trucks/yr
Vehicle miles traveled (VMT):	5,457	417	miles/yr
Log Trucks (Unpaved Road)			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.7	0.7	miles/trip
Unloaded vehicle weight:	13.6	13.6	tons/truck
Loaded vehicle weight, (approx.):	42	42	tons/truck
Material Throughput	555,216	40,634	tons/yr
Total number of trucks:	19,550	1,431	trucks/yr
Vehicle miles traveled (VMT):	13,685	1,002	miles/yr
Bark /Sawdust Fuel Trucks (Unpaved Road)			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	1.0	1.0	miles/trip
Unloaded vehicle weight:	13.3	14.5	tons/truck
Loaded vehicle weight, (approx.):	41.5	41.5	tons/truck
Material Throughput	57,882	4,236	tons/yr
Total number of trucks:	2,053	157	trucks/yr
Vehicle miles traveled (VMT):	2,053	157	miles/yr
Finished Lumber Trucks (Unpaved Road)			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.6	0.6	miles/trip
Unloaded vehicle weight:	15	15	tons/truck
Loaded vehicle weight, (approx.):	35	35	tons/truck
Total number of trucks:	4,006	293	trucks/yr
Vehicle miles traveled (VMT):	2,403	176	miles/yr
1" Rough Green Lumber (Unpaved Road)			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.6	0.6	miles/trip
Unloaded vehicle weight:	13.3	14.5	tons/truck
Loaded vehicle weight, (approx.):	40	40	tons/truck
Total number of trucks:	385	28	trucks/yr
Vehicle miles traveled (VMT):	231	17	miles/yr
Block Trucks (Unpaved Road)			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.6	0.6	miles/trip
Unloaded vehicle weight:	13.3	14.5	tons/truck
Loaded vehicle weight, (approx.):	40	40	tons/truck
Total number of trucks:	135	10	trucks/yr
Vehicle miles traveled (VMT):	81	6	miles/yr

1. Total number of trucks calculated from material throughput divided by difference between unloaded and loaded weight.
For finished lumber, rough green lumber and block trucks, total trucks were based on 2004/2005 data and future increase.
2. Vehicle miles traveled (VMT) = Total # of trucks * # miles per roundtrip

Average Fleet Weight **27.38** **27.58**

Emission Calculations

Pollutant	Emission Factor (lb/VMT) Past Actual	Emission Factor (lb/VMT) Increase	VMT Past Actual	VMT Increase	Emissions (tpy) Past Actual	Emissions (tpy) Increase
TSP	7.21	7.24	24,055	1,785	86.76	6.46
PM_{10}	2.06	2.06	24,055	1,785	24.73	1.84
$PM_{2.5}$	0.21	0.21	24,055	1,785	2.47	0.18

Calculated from:

lb PM = k*(silt%/12)$^{0.7}$*(Wt/3)$^{0.45}$*(365-rain days)/365

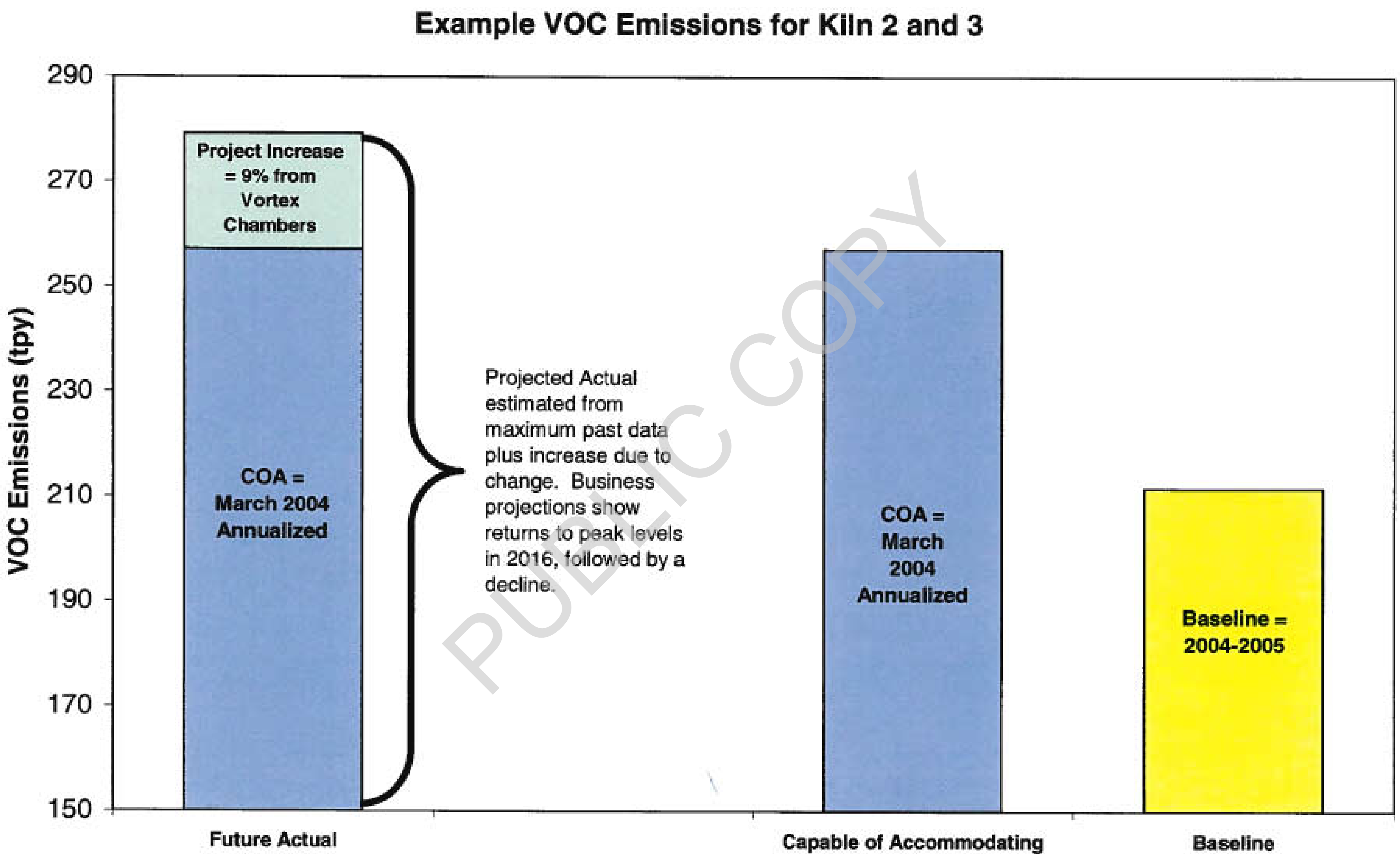
lb $PM_{10}/PM_{2.5}$ = k*(silt%/12)$^{0.9}$*(Wt/3)$^{0.45}$*(365-rain days)/365

(Emission factors are based on the average of the loaded and unloaded lb/VMT factors)

where:	$k_{lb\ TSP}$ =	4.9 (See AP-42, Table 13.2.2-2)
	$k_{lb\ PM10}$ =	1.5 (See AP-42, Table 13.2.2-2)
	$k_{lb\ PM2.5}$ =	0.15 (See AP-42, Table 13.2.2-2)

% Silt:	8.4	(See AP-42, Table 13.2.2-1)
Operating Days	365	
Average # Rainy Days:	110	(See AP-42, Figure 13.2.2-1)

Wt is the average fleet weight



*9% increase based on Kiln 3 modification (March 2009) which showed a potential for kiln batch times to decrease from 19 to 17.5 hours